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Address.

ACUTE TUBERCULAR INFLAMMATION OF THE ILEO-COLIC GLANDS SIMU- LATING APPENDICITIS.*

By HOMER GAGE, A.M., M.D., WORCESTER, MASS.

THE attention of the whole world seems just now to be centered on war, with its horrible story of the destruction of property, homes, and human life.

As disciples of medicine and surgery, our interest lies not in the machinery and engines of destruction, but in the means of relieving the suffering and restoring the health of those who are fortunate enough to be enrolled among the wounded rather than the dead.

I presume your thoughts, like mine, have been focussed upon the field and base hospitals where so many poor fellows are carried, and where there is often so much to do and so little to do it with. But perhaps, like me, you have wondered whether after all, in spite of all the difficulties and deficiencies, there must not be a very real satisfaction in dealing with sound bodies, and in the feeling that wherever success is possible, it is going to be permanent; and in escaping even for a little while from our constant and so often hopeless struggle with tuberculosis and cancer.

It is our perpetual war, and is ever fought against tremendous odds, and under most discouraging conditions, discouraging, because the favorable results, at any rate the complete vic-

tories, still seem so far beyond our control and so few.

In some cases we fail, because the infection is in localities that are beyond our reach; in others, because it is so general that local intervention is of little use; in others, our attempts at interference seem to stir up a general infection or cause a transfer of the infection to new fields, most often to the meninges; in still others, our best efforts involve permanent deformity or disability; while in most of them it affords but a temporary and all too feeble check. And yet we must fight on, ever seeking and hoping for more knowledge, better weapons, and new methods.

I have been led to speak to you tonight about one phase of this great surgical warfare against tuberculosis, not because I can offer you any better weapons or new methods, nor have I any new knowledge, but because it seems to me that the subject has not yet received the recognition that its importance warrants. I refer to the tubercular infection of the mesenteric glands in the ileo-cecal angle.

The subject is hardly referred to in our surgical text-books, and has received scant attention in the great surgical systems; but it has occurred often enough in my own experience, to make me feel that it must be more common than we have been led to believe.

It is, moreover, of especial interest, because it so often and so closely simulates appendicitis, and because it seems to offer more than a reasonable chance for permanent cure—the results being distinctly more favorable than in the tuber-

* Read before the Springfield Academy of Medicine, Dec., 1914.

cular glands of the neck, which in some respects they closely resemble.

We have of course been very familiar for a long time with the manifestations of tuberculosis in the abdomen, as a general tubercular peritonitis, or as a general infection of the lymphatics in *tabes mesenterica*, in the forms of intestinal ulceration, and in the genito-urinary tracts of both sexes; but the relation of these different manifestations to each other, their beginnings and their relation to tuberculosis of the throat and air passages, has been but little understood.

Its discovery as a local process confined to the ileo-cecal glands has not by any means cleared up these difficult and important problems, but it has given us a new viewpoint. It seems not unreasonable to infer that tubercular infection through the intestinal walls, and especially through the wall of the cecum, may be a pretty constant menace; that the natural resistance of the individual may permit it to pass through the whole intestinal tract without inflicting any damage; that with other individuals this resistance may not be strong enough to prevent the invasion, until the lymphatics have become involved and their assistance called into play; in still others, the resistance may be so low that the lymphatics are unable to take care of it, and a general peritonitis or general *tabes* is the result. These are, of course, mere hypotheses, but they suggest new lines of thought, and new channels for pathological research.

What knowledge we possess of these conditions has been derived chiefly from autopsies and from operations for the relief of tubercular peritonitis,—in other words, we had looked at these conditions only in their later and more advanced stages.

It was only after the right iliac region had become nearly, if not quite, the most operated on part of the human body, that we began to find an infection of the glands in the ileo-cecal angle without demonstrable evidence of tuberculosis anywhere else.

In cases of acute appendicitis we do occasionally find a moderate enlargement of these glands, although it is relatively much more infrequent than it would seem reasonable to expect. Such glands are usually not larger than a small bean, and on section, show simply ordinary inflammatory changes. These are not to be confounded with the tuberculously infected glands about which we are concerned, and which are, as we shall see, often found without any apparent lesion in cecum or appendix.

One of the very earliest cases in which an acute tubercular infection of the ileo-cecal glands was found and the glands removed, was reported by the late Dr. Maurice Richardson before the American Surgical Association in 1900, although the operation had been done five years earlier.

In an operation upon a boy five years of age, undertaken for a supposed acute appendicitis, he

had found "a healthy cecum, and an unaffected appendix, but in the mesentery of the ileo-cecal coil were numerous enlarged glands, varying in size from that of an English walnut, to that of a large pea," two of them had a cheesy content, and all were pronounced tubercular by Dr. Mallory.

In commenting upon this case Dr. Richardson said "cases of this kind must be extremely rare. Not that tuberculosis of the abdominal viscera is rare, for taken as a whole, it is a common disease. Limited, however, to a single small area of the peritoneum, or of the peritoneum covered viscera, it is unusual; limited to an area that permits complete extirpation, it is more unusual still."

At the same meeting of the American Surgical Association, Dr. J. W. Elliott also presented a paper on the "Successful Removal of Acutely Inflamed Tubercular Mesenteric Glands," and reported a case operated upon in 1899, very similar to that of Dr. Richardson.

A year later, in 1901, Dr. Richardson read a second paper, this time before the New York State Medical Society, on "Acute Tuberculosis of the Mesenteric Lymph Glands," but had no more cases to report,—he did say, however, "That unless I am much mistaken, emphasis laid upon this subject by full discussion, with renewed experience, will show that it is not so unusual a disease as has been supposed."

At about the same time Gerard Marchant had called attention to the fact that a peri-cecal tuberculous adenitis could give rise to symptoms of acute appendicitis; and he maintained that the tubercular infection reached these glands through the appendix, even though it, the appendix, presented no microscopic or macroscopic evidence of the infection in itself, a view which is still widely held, especially by the French surgeons.

These are, so far as I can discover, the earliest papers to call attention to an acute tubercular adenitis, limited to the ileo-cecal mesentery, and closely resembling in its clinical aspects, a chronic appendicitis.

Since then, many more cases have been reported, and although they have not even yet attracted very general attention, they are enough to establish beyond question the soundness of Dr. Richardson's prediction that "it would be found not so unusual a disease as has been supposed."

In a paper read before the International Congress for Tuberculosis in 1908, Eisendrath gave synopses of seven cases reported by French surgeons, to which he added two from his own hospital records, in all of which tubercular ileo-cecal nodes were found.

In a discussion of this subject before the New Hampshire Medical Club in 1913, Dr. David W. Parker reported that he had been able to collect the reports of 39 cases, chiefly English and German, to which were added two more that had occurred in his own experience,—and on the

same occasion Dr. Lund of Boston referred to "about a dozen cases of his own, of tuberculosis of the mesenteric gland, with or without a chronic appendicitis."

To these I am able to add from my own records 11 cases of acute and one of chronic tubercular adenitis, limited to the ileo-cecal angle. From the relative frequency with which these cases have been observed in my own limited experience I cannot help feeling that they are much more common than the meagre journal reports and the scant references to them in surgical literature would seem to indicate.

Perhaps they have been so common in the larger clinics, that it seemed hardly worth while to report them; and I should have hesitated to bring so small a matter to your attention to-night, if it were not that the subject opens up some interesting points in the study of infections, and that some of the clinical features seem to me not wholly inconsequential.

Let me briefly restate the exact conditions and its limitations to which I wish to call your attention. It is not the existence of general tuberculosis of the mesenteric lymph glands, but of an acute local infection involving only the glands which drain the ileo-cecal region, and I am not referring to the acute hyperplasia of the ileo-cecal glands occasionally met with in acute inflammations of the appendix and cecum. The condition is that of a primary acute tuberculosis limited to this region.

What is the source of this infection, and why is it found so much more often here, than in any other particular part of the mesentery? In attempting to answer these questions our attention is obviously attracted at once to the structures which are drained by these glands, viz.: to the cecum and appendix.

Corner has pointed out the relative stasis of intestinal contents in the cecum, with the consequent multiplication of micro-organisms here, as perhaps the underlying factor, just as it is probably one of the important factors in the causation of appendicitis.

Tuberculosis of the cecum itself is by no means as rare as was formerly supposed. I have myself removed the cecum twice for tubercular stricture causing chronic intestinal obstruction.

It is of course possible that in the gland infections, there has been a primary lesion in the mucous membrane of the cecum or appendix which has healed spontaneously, or heals after the removal of the glands; but such a supposition is not necessary, because it seems pretty clear that tubercle bacilli can, as Jordan and Corner say, pass through the intact mucous membrane and give rise to gland tuberculosis in animals, without leaving any trace of their migration in the intestinal wall.

This has been disputed by Takeya and Dold of the University of Tübingen, but is accepted by Thiemann, and was affirmed by Dobroklousky as long ago as 1890.

It is moreover in harmony with the clinical

evidence in these cases submitted by a large number of independent observers, which would indicate that in the great majority of them, no demonstrable lesions could be found at the time of operation, and no persistent through unobserved lesion was indicated by the subsequent history.

Although the glands of which we have been speaking are not so prone to form large infiltrating abscesses as are the acute tubercular glands of the neck, the analogy is nevertheless quite suggestive, especially in some of its clinical aspects; and is further supported by the numerous lymphoid follicles which are contained in the mucosa of the appendix, and which are very similar to the lymphoid tissue in the tonsils.

Numerous instances of what have seemed to be primary tubercular lesions of the appendiceal mucosa have been observed, and there would appear to be no reason why the bacilli should not pass through the uninjured lymphoid follicles of the appendix, just as they are believed to do through the follicles of the tonsils; and to my mind this is the most rational mode of explaining the infection of the ileo-cecal glands, and as has already been pointed out, seems to be the opinion of the French surgeons.

Another interesting question in this connection is the relative frequency of the human and the bovine tubercle bacilli found in infection of the mesenteric glands, and although I am aware of no case of the acute limited forms which we have been considering, in which the differentiation has been worked out, there is an interesting study of 71 cases of mesenteric gland infection in general, by Hess, in which the type of the infecting organism has been isolated and studied.

In 62% he found an infection with the bovine type of bacillus, and goes on to say, "that this type cannot, then, be disregarded, and in connection with the percentage of bovine infection, which has been demonstrated in other organs, these figures emphasize the fact that mesenteric glands form the chief portal of entry for the bovine bacillus, with the tonsils alone to share the distinction."

Had he said that the lymphoid follicles of the intestine formed the portal of entry, I think he would have been more nearly correct.

However the distinction is probably of little importance, as Hess himself reports three cases, two in children, and one in a young adult, in all of which he found the human type; and Theobald Smith, in an article on "A Study of the Tubercle Bacilli Isolated from Three Cases of Tubercular Mesenteric Lymph Glands," says that "The bacilli isolated from these three cases of presumable food infection, do not correspond to the bovine type of bacilli in any one particular."

It may be safely inferred therefore, that both forms are present in these infections, and that milk, cream and butter are not more important factors in the causation of tubercular lymph

nodes, than many others about which we hear much less in the public prints, and before legislative committees.

In reviewing the clinical history of these cases, one finds that the only attempt to make any real classification, is that of Corner, who in his second paper, published in 1908, makes a distinction between the tubercular mesenteric glands found in adults, which he says are most frequent in the ileo-cecal region, rarely form a palpable tumor, and are frequently associated with the appendix, and those found in children, which may be anywhere in the mesentery of the small intestine, usually in its lower part, are due to infection from the small intestine, and usually form a movable palpable tumor under the left rectus.

These conclusions are, however, not confirmed by a study of the cases reported by Thiemann, Richardson, Parker, and the French surgeons, nor by my own.

Four of my cases ranged from seven years to twelve, and seven of them from 16 to 25. In none of them was there a palpable tumor, and in all but one the glands were confined to the ileo-cecal region; and in that one, they were chiefly in the same location, though a few small glands were palpable in other parts of the mesentery.

Neither the findings nor the clinical history differed in any material respect between the younger and the older group. All of the cases happened to be in females. The condition, however, is certainly not confined to one sex, and I am not in a position to say that it is distinctly more common in one than in the other. My own experience would lead me to suspect that it was.

The predominant feature in them all, as well as in most of the cases elsewhere reported, has been an attack of pain and tenderness, localized in the right iliac region, of recent origin, accompanied by a slight rise of temperature, and without demonstrable tumor; in only one of my cases was a small tumor believed to be present. Nausea was present in almost all, but vomiting occurred only in four.

In one case there was a history of two previous attacks of appendicitis,—one six months, and one two years before, another had had her first attack of right iliac pain and vomiting eight months before, had been in bed for two days, and had been unable to stand erect for several days afterwards; she had had six similar attacks before operation. She had two glands in the ileo-cecal angle, each of which contained a large amount of caseous material, on the smears of which tubercle bacilli were easily demonstrated.

The appendix presented nothing remarkable, either upon gross or upon microscopical examination. In these, as in all the rest, the clinical history seemed to point unmistakably to an appendicitis of moderate severity.

One case was especially interesting, because the appendix had been previously removed for the relief of the same symptoms. She had had more or less pain in the right side of the abdomen ever since the operation,—for three days

before entrance to the hospital the pain had been very severe, with nausea but no vomiting; three enlarged glands were found in the ileo-cecal region as big as English walnuts, one was ruptured in the process of removal, and contained a thick cheesy material—culture from which showed no growth. During her convalescence she still complained at times of the old pain, but I am sorry to say that I have been unable to follow her subsequent history.

I have often wondered whether I overlooked some other infected glands, or whether the gland which I ruptured may have infected the peritoneum. Either supposition is of course quite possible, although at the time of her discharge, one month after operation, she seemed to be much improved.

None of the cases presented any evidence in personal or family history suggesting tuberculosis, although in two or three, subsequent investigations revealed the presence of tuberculosis in collateral branches.

It will be readily appreciated that an accurate differential diagnosis in these cases is attended with the greatest difficulty. I have never yet myself been able to make the correct diagnosis before opening the abdomen,—every one of my own operations was undertaken with the expectation of finding an inflamed appendix and I was as much surprised at my twelfth experience, as I was at my first.

I have, moreover, sometimes been led by an atypical history, or by the appearance of the patient, to suspect a glandular tuberculosis, only to find a simple catarrhal or obstructive appendicitis.

It is perfectly possible, I suppose, that personal or family history, or the physical examination may occasionally point clearly to an acute tubercular infection of these glands, but I have never been fortunate enough to meet with such a case, or else I have been too dull to recognize it.

Fortunately, the indications for operative interference are not dependent on an accurate diagnosis. The symptoms in my series were all those of an acute inflammatory process in the right iliac region, so directly suggestive of an acute appendicitis,—and I think no surgeon of experience could have questioned the propriety of operation, and operation without delay.

In all of the other cases which I have been able to study from the reported records, the same positive indication for operation was present, and the appendix seems always to have been suspected as the cause of the outbreak.

In most of them the appendix was removed as well as the glands. It had been previously removed in one of mine, and was taken out in all but one of the others. Why I did not take it out in this one, I cannot now recall, and my record does not state. My present opinion is that it should always be excised.

I have never been able to demonstrate the existence of any tubercular infection or ulceration of the appendix in these cases, although all of

them showed more or less chronic inflammatory or obstructive changes.

The cecum was not opened in any of them, but neither inspection nor palpation suggested anything abnormal. I think that the infection of the glands was without any primary demonstrable lesion in the wall of the cecum or appendix. I believe, however, that the appendix will almost always, if not always, show signs of inflammation or obstruction, and should always be removed.

The technic of the operation is, therefore, that of simple appendectomy, plus the dissection of the infected glands. This should, if possible, be accomplished without rupture of the glands, so that primary union may be obtained. Care must be taken not to interfere any more than is absolutely necessary with the blood vessels of the mesentery, so that the viability of the intestine should not be impaired, and all hemorrhage must be securely stopped.

Rupture of a gland with the escape of cheesy contents, so that there is any material contamination of the surrounding peritoneum, raises the question of the desirability of drainage. Of course, when the escaping contents are purulent, one should always drain, and in the border line cases, the old surgical maxim, "when in doubt, drain," seems to me, still to hold good.

I have not yet met with any cases of mixed infection, though there would seem to be no reason why it should not occur. The laboratory report has been, "no growth from the culture."

It is by no means always possible to obtain the tubercle bacilli from the gland tissue, or on the smear taken from the gland contents. We have been able to demonstrate the bacilli in four of these cases, and have identified the others by finding typical tubercle and giant cell formations.

In spite of the fear with which the announcement of a tubercular infection always inspires us, I think we can very confidently look forward, in the type of case under consideration, to a favorable result.

One can readily understand the disappointment and anxiety which Dr. Richardson tells us was occasioned by the discovery of tubercular glands in his first case in 1895, before the existence of localized glandular infection had been recognized, but his patient is now a strong vigorous young man of 25, and although a very few instances of subsequent generalized tuberculosis have been reported, almost all of them have been free from subsequent manifestations.

Some of my own cases I have been able to follow up to the present time, and to know that they have remained perfectly well. Only one of the others, so long as I was able to follow them, had developed any evidence of tubercular taint, so that I feel that we may safely regard the prognosis as favorable.

All of my cases recovered from the operation, although convalescence was complicated in one by pneumonia, and in another by phlebitis of the left leg.

What would happen if these glands were allowed to remain, raises an interesting question which it is not easy to solve. In the case reported by Parker, adhesions between an inflamed caseous mesenteric lymph gland, the size of a walnut, and the adjacent lower part of the ileum had caused a sharp kink in the bowel, with symptoms of obstruction, and had so infected the bowel as to lead to its rupture during the process of separation.

In other reported cases, considerable abscess cavities have been found. On the other hand Treves says, that he has seen the glands diminish after simple exploration, and the presence of small cicatrized calcareous glands sometimes showing, as described by Corner, in an x-ray plate, like a ureteral calculus, would seem to indicate, that, in some cases at least, there is a definite attempt at spontaneous resolution or cure.

This, however, should not deter us from surgical interference, because our interference is undertaken only when symptoms indicating an acute inflammatory process in the right iliac region are present, and the condition once disclosed by the incision, there can be no question as to the desirability of removing the infected glands.

I have tried thus briefly, and I am afraid very imperfectly, to call your attention to a form of tubercular infection of the mesenteric lymph glands, which is to be distinguished from the ordinary form of *tuberculosis mesenterica*, by being limited to the group of glands situated in the ileocecal angle, and characterized by an acute inflammatory reaction, closely resembling the milder forms of appendicitis.

It is certainly much more common than a review of surgical literature would indicate, and a knowledge of its existence, its proper treatment, and its prognosis is, I think, of importance to every one who is operating in the region of the appendix.

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LYMPHOCYTOSIS IN CANCER.—Through the Washington Academy of Science, Drs. John B. Murphy and John J. Morton, of the Rockefeller Institute for Medical Research, announce their belief, based upon experimental observation, that lymphocytosis is associated with increased immunity to cancer. It is suggested, but still remains to be proved, that injection with an extract of lymphoid tissue may increase this immunity.

Massachusetts Medical Society.

MEETING OF THE SECTION OF MEDICINE.

SYMPOSIUM ON HEART DISEASE.

JUNE 8, 1915.

- I. The Use of Digitalis in the Various Forms of Cardiac Arrhythmia, by Henry A. Christian, M.D., Boston.
- II. The Relationship of the Abnormal Heart Beat to Prognosis, by Paul D. White, M.D., Boston.
- III. The Treatment of Heart Disease, by F. C. Shattuck, M.D., Boston.

I.

THE USE OF DIGITALIS IN THE VARIOUS FORMS OF CARDIAC ARRHYTHMIA.

By HENRY A. CHRISTIAN, M.D., BOSTON.

IN recent years new methods have been available for studying cardiac action in man; methods which make possible an accurate analysis of the contraction wave, as it sweeps over auricle and ventricle, with a better understanding of disturbances in heart rate and rhythm. The polygraph and the string galvanometer or electrocardiograph are the instruments which have been of greatest service in this study. With them the action of digitalis on the human heart can be investigated with the thoroughness that is used in the pharmacological laboratory for animal experimentation, with the very great advantage that it is the human heart disturbed by natural disease that is being studied, not the normal heart of an animal or an animal's heart in which man's acquired disease is but crudely imitated.

It is my task this afternoon to place before you some of the results of this work. I will attempt to give an interpretation and an application to clinical practice of studies which have been conducted in many clinics rather than to report any new studies of my own. However, instead of analyzing the literature on the subject or quoting the opinion of others I will give deductions from this work as we have attempted to apply it to patients observed in the clinic of the Peter Bent Brigham Hospital.

Now if the application of the polygraph and electrocardiograph to the study of cardiac disorders is to be of any real usefulness to the general practitioner of medicine, the knowledge gained from such studies must be translatable into the terms of general practice, that is, brought into the range of such observation as is possible with finger, eye and stethoscope. I believe that by the use of very complicated and expensive apparatus we have acquired so much better knowledge of cardiac arrhythmias that we are in a position by very simple means to recognize accurately the common arrhythmias, and understanding better their mechanism we can

apply in their treatment our therapeutic measures with far greater success.

Irregularity in heart action may arise in several ways. Normally the contraction impulse begins at a point in the region where the superior vena cava joins the right auricle and spreads over the auricle as a contraction wave. The contraction of the auricle originates an impulse which travels from auricle to ventricle along the conduction system or His bundle, and arriving at the ventricle starts almost simultaneously in many parts of the ventricles a contraction of ventricular musculature which drives out into the peripheral vascular system a certain amount of blood. Irregularity in heart action will result from disturbances at the point of origin of the impulse, in the auricle, in the conduction system or in the ventricle. For our purposes we

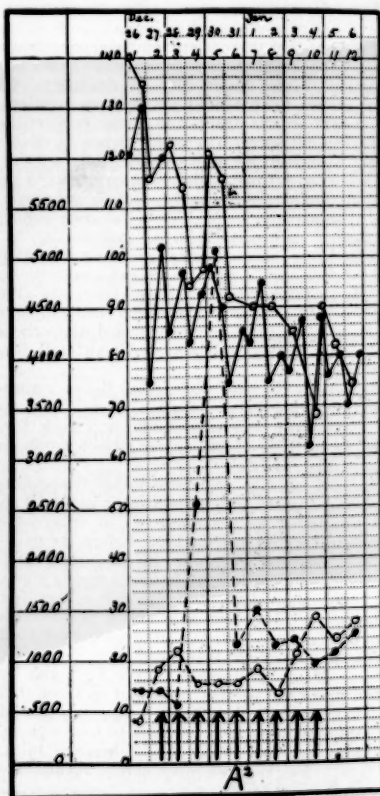


FIG. 1.—Patient with auricular fibrillation. Dots joined by solid line indicate radial pulse rate. Circles joined by solid line indicate urine output in c.c. Circles joined by broken line indicate fluid intake in c.c. Arrows over A^2 indicate days on which the patient received three doses of 0.1 gm. each of powdered digitalis leaves.

need discuss only those arrhythmias which frequently are associated with or are the cause of cardiac decompensation. As with cardiac murmurs so with cardiac arrhythmias, it is the evidence of cardiac decompensation that should indicate the need for therapeutics, not the finding of an irregular pulse.

One of the most frequent arrhythmias in this sense of causing cardiac decompensation is auricular fibrillation, a condition in which the auricle instead of contracting regularly and rhythmically, at a rate of 70 to 90 per minute, is in a condition of very rapid fibrillary twitching with no functional contraction in the sense of squeezing its contents into the ventricle during the period of ventricular diastole. There being no orderly sequence of contractions in the auricles, these fibrillary twitchings are continually starting impulses along the conduction system of varying intensity, to only some of which can the

ventricular musculature respond by contraction. The result is an extreme irregularity in the rate and force of the heart beat. The diagnosis can be made readily in most cases by feeling the pulse and finding an irregularity in rate and force which is without any suggestion of a dominant rhythm. If the patient shows signs of cardiac decompensation the stethoscope over the heart apex will reveal the same type of tumultuous irregularity in rhythm, and with the finger on the radial pulse there is a striking difference between apex rate and radial pulse because some of the weaker ventricular contractions fail to give an impulse to the blood stream that reaches the radial artery as a pulse wave. Finding a marked irregularity in pulse rate and a striking discrepancy between apex rate and radial pulse, the diagnosis of auricular fibrillation is justified. With auricular fibrillation digitalis almost invariably produces a striking effect, as shown by

Fig. 1 and Fig. 2, unless the myocardium is damaged so extensively that no longer can it respond to the digitalis.

The effect of digitalis is to slow the pulse rate (Fig. 1) and to increase the work of the heart, as shown by decrease in the signs of cardiac decompensation (edema, subcutaneous and pulmonary, ascites, cough, bronchitis, dyspnea, etc.). Sometimes there is a diuresis (Fig. 1); sometimes not (Fig. 2). A very important evidence of the beneficial action of digitalis is the decrease in the pulse deficit, i.e. in the difference between apex beat and radial pulse (Figs. 1 and 2). In using digitalis it is particularly important to keep this effect in mind, for if one counts the radial pulse alone there may be no particular change in pulse rate, though the number of cardiac contractions has been materially decreased (Fig. 2). In fact in this form of cardiac arrhythmia the counting of the radial pulse may be very misleading, it being within normal limits when actually the heart is beating very rapidly (Fig. 2). To count the heart beats with the stethoscope is the all important thing, not the counting of the radial pulse.

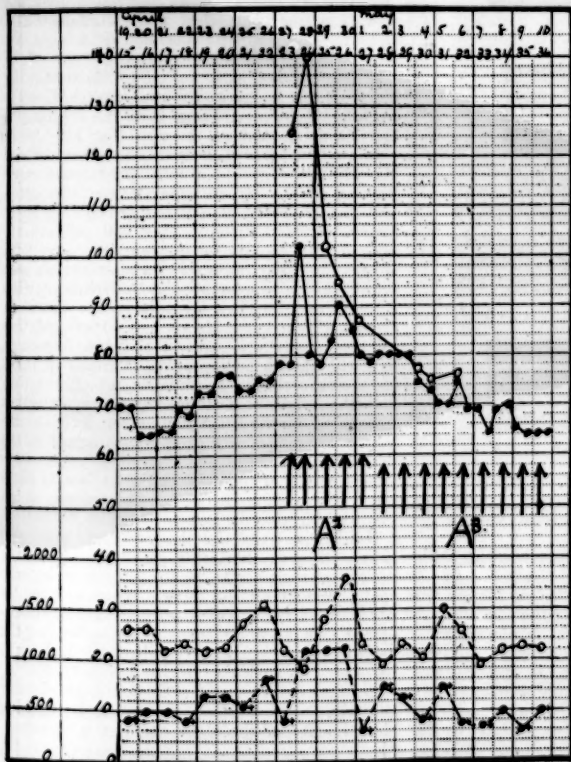


FIG. 2.—Patient with auricular fibrillation. Dots joined by solid line indicate radial pulse rate. Circles joined by solid line indicate apex rate. Dots joined by broken line indicate urine output in c.c. Circles joined by broken line indicate fluid intake in c.c. Arrows over A^1 indicate days on which the patient received three doses of 0.1 gm. each of powdered digitalis leaves. Arrows over A^2 indicate days on which the patient received two doses of 0.05 gm. each of powdered digitalis leaves.

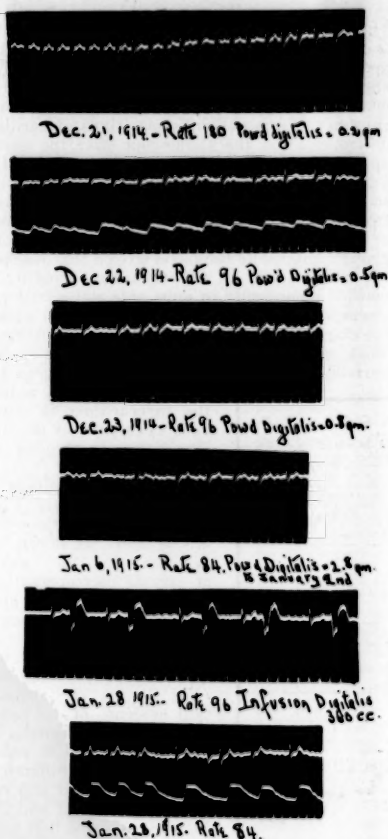


FIG. 2.—Electrocardiograms from patient with auricular fibrillation. Upper four curves show progressive effect of digitalis given in one period. The fifth curve shows bigeminy produced by digitalis given in another period. The sixth curve taken immediately after the fifth shows temporary character of bigeminy in this patient.

How does digitalis act in these cases of auricular fibrillation to improve the heart action? It is mainly an effect through the conduction system; digitalis impedes conduction in the His bundle, and the result is that fewer auricular contractions send through impulses to originate ventricular contractions, and so the ventricle beats more slowly. Beating more slowly, there is more time for the ventricle to fill and more time for the muscle to recover from fatigue, so the systolic output is increased. Probably also digitalis exerts an action on the myocardium, causing the contraction to be more forcible, and by its action it improves coronary circulation. Digitalis in these cases produces no effect on auricular contraction:—fibrillation continues as be-

fore. These effects are shown by the electrocardiograms (Fig. 3). If digitalis is pushed too far, nausea usually develops as a signal for its omission. In other cases a characteristic toxic effect appears,—the pulse becomes bigeminal. Electrocardiograms show (next to last curve in Fig. 3) that this bigeminy is produced by a ventricular extra systole or ectopic beat, following closely after the regular ventricular contraction whose impulse has originated in the auricle. This condition is easily recognized with the stethoscope over the heart or by the palpating finger at the wrist. Whenever a coupling of the beats is detected with pauses of varying length between the couples and a pretty constant interval between the two beats of the couples, one can feel pretty sure of the existence of this toxic effect of digitalis in a case of auricular fibrillation. The condition may persist for some time or the rhythm may return quickly to its original form (see last curve Fig. 3), depending upon the severity of the toxic effect of the digitalis. The occurrence of this phenomenon is a sign, of course, for the omission of digitalis.

In some cases with auricular fibrillation in which edema is marked a much better diuresis is obtained by combining with the digitalis a diuretic drug, such as theocin (Fig. 4).

In another form of arrhythmia, namely, auricular flutter, digitalis usually produces a very striking effect. By auricular flutter is meant a condition in which the auricles are beating regularly and very rapidly, over 200 per minute (Fig. 5), too rapidly for the ventricle to respond to each auricular impulse. As the ventricle lags behind the pulse becomes slightly irregular, with a tendency for the irregularity to come in groups which repeat themselves. However, this condition usually is difficult of diagnosis except with the electrocardiograph. Digitalis in these cases either throws the auricle into fibrillation and when digitalis is stopped the normal rhythm is restored, or the heart slows down directly into a normal rhythm with great improvement in the patient's condition.

The action of digitalis in flutter is a twofold one. There is an action on the auricle which disturbs the ectopic focus of impulse formation, which is responsible for the very rapid auricular beat, either in inhibiting it and allowing the normal pace maker to regain control, or by generally disturbing the auricle so as to produce fibrillation, from which normal rhythm is restored. In addition there is an action on the conduction system and ventricular muscle such as occurs in auricular fibrillation cases.

In these two forms of arrhythmia the effect of digitalis is more constant and more striking than in any of the other common types of arrhythmia.

In pulsus alternans frequently digitalis produces good results. In true pulsus alternans the pulse is regular in rate but every other beat is weaker than its predecessor (Fig. 6). In such a case the pulse rate may be definitely slowed by

digitalis (Fig. 7) with much improvement in the patient's condition. It is to be remembered, however, that a pulsus alternans is a sign of a very much impaired myocardium, and when the myocardium is greatly impaired the likelihood of functional improvement from digitalis is much decreased. To push digitalis in such a case may do much damage. Here it is particularly difficult to judge how far to carry digitalis therapy if no evident effect is produced. It would seem that in many of these cases the margin between no therapeutic effect and a serious toxic effect is a very narrow one. The same thing holds true for the rapid, regular, though decompensated heart.

In the rapid, regular, decompensated heart digitalis, when it acts, appears to have a three-fold effect. It slows the rate by increasing vagus inhibition and by increasing conduction time between auricle and ventricle (Fig. 8), and it strengthens heart action by some direct action on the myocardium and coronary circulation. This type of case often seems definitely resistant to digitalis and the patient may take large amounts before any effect can be detected. It is always well to remember in such cases to watch the patient carefully, for sometimes the digitalis action, which has been long delayed, develops with great rapidity into marked activity so that the patient, who shortly before has shown no digitalis effect, quickly develops toxic symptoms.

In paroxysmal tachycardia there is very little evidence that digitalis produces any good effect. In sinus arrhythmia and in compensated hearts with ectopic beats or extra systoles digitalis is not indicated. Sinus arrhythmia is easily recognized by palpating finger or stethoscope as a rhythmic variation in interval between successive beats, frequently a rhythmical variation synchronous with respiration. Extra systoles or ectopic beats are familiar to you as dropped beats. Two beats come rather close together and

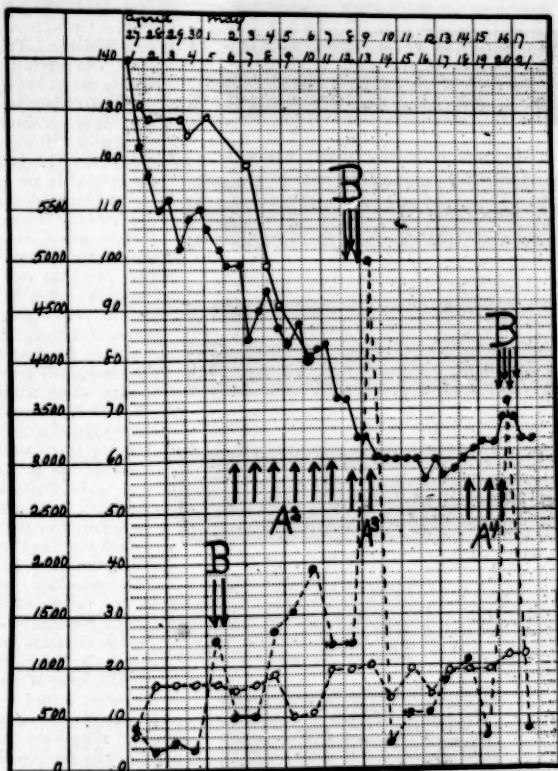


FIG. 4.—Patient with auricular fibrillation. Dots joined by solid line indicate radial pulse rate. Circles joined by solid line indicate apex rate. Dots joined by broken line indicate urine output in c.c. Circles joined by broken line indicate fluid intake in c.c. Arrows over A indicate days on which the patient received three doses of 0.1 gm. each of powdered digitalis leaves. Arrows over A² indicate days on which the patient received two doses of 0.05 gm. each of powdered digitalis leaves. Arrows over A³ indicate days on which the patient received three doses of 10 c. c. each of infusion of digitalis. Arrows under B indicate doses of 0.5 gm. each of theocin.

the second of these is followed by a lengthened pause. The extra systoles usually come at no fixed rate. Both these types of arrhythmia occur often in hearts with no other evidence of disturbed function, and their presence calls for no digitalis therapy. In decompensated hearts with a moderate number of extra systoles digitalis is indicated and acts much as it does in the decompensated heart with regular rhythm. When extra systoles are so numerous that cardiac decompensation appears to be largely a result of the arrhythmia, much caution is required in using digitalis because there is some evidence that digitalis at times increases the number of extra systoles and makes matters worse. However this question of the exact relation of digitalis to extra systoles is one still under discussion. In most cases extra systoles are more an

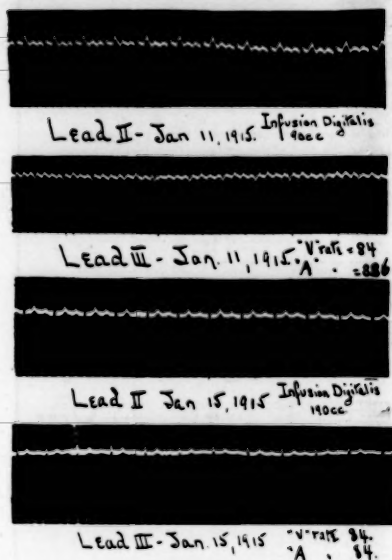


FIG. 5.—Electrocardiograms from patient with auricular flutter. Two upper curves show Leads II and III while in flutter. Two lower curves show Leads II and III after return to normal rhythm.

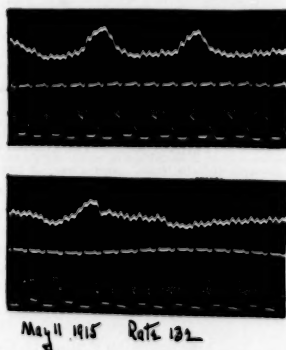


FIG. 6.—Curves from patient with pulsus alternans. Upper set of curves shows arteriogram below, electrical pneumogram above and electrocardiogram from Lead II in middle. Lower set of curves shows same except electrocardiogram is from Lead III.

incident in, rather than a cause of, cardiac decompensation, and their presence can be neglected in considering the probable efficiency of digitalis therapy.

In cases of heart block not of digitalis origin, digitalis should be tried if the patient is decompensated.

Results are sometimes very good; at other times it would seem that the patient is made worse. Trial must be made to determine this. So digitalis should be applied, but caution in its use in heart block is necessary.

It is rather beyond the province of my part in this symposium to discuss the various forms of digitalis. However, it seems to me that the all-important things are to see that the form of digitalis used is an active preparation and to use it in sufficient dosage to get effects. In my own judgment various digitalis preparations are interchangeable in ratio of their potency, and consequently it makes no difference what form you use provided you use it in the proper kind of a case in sufficient dosage. Any form used by mouth will require more than 24 hours to produce an effect. A form of digitalis preparation suitable for intravenous use so introduced into the body will begin to produce an effect in a few hours, often within one hour, and this form is indicated where prompt actions are required. Subcutaneous use gives an effect less rapid and less certain than intravenous use. Furthermore, most of the preparations which are potent are apt to be irritating when introduced subcutaneously. It seems to me that when quick action is required or the patient is vomiting and cannot retain the drug, intravenous use is preferable to subcutaneous. In the hospital I have the apothecary purchase good powdered digitalis leaves, whose potency I find out by using them in patients such as cases of auricular fibrillation in which digitalis ordinarily works well. If I get good effects I know that lot of digitalis is potent. In the form of powdered leaves or freshly made infusion I find I can treat effectively the large proportion of cases with cardiac decompensation. For simplicity I use only these two forms of digitalis for mouth dosage. Occasionally a case requires a prompt action or is vomiting. In such a case I use strophanthin intravenously, with due regard to the necessary caution against using strophanthin in a patient who has been taking digitalis by mouth. Very occasionally it seems desirable to use some form of digitalis subcutaneously. For this I choose liquid digipuratum. I can see no advantage in multiplying the number of preparations of the digitalis group beyond this until new knowledge has come to throw light upon cardiac therapy which will enable us to select active components of the digitalis bodies to fit the needs of certain types of cases. As to dosage, relatively large doses should be used in periods of decompensation. With compensation restored very small doses continued over long periods certainly seem to be of great help in maintaining compensation. Much clinical experience supports this, and the recent electrocardiographic studies of Cohn and others show that the digitalis effect on the heart muscle is long continued after dosage has ended, and presumably with a continuation of small doses this effect is maintained.

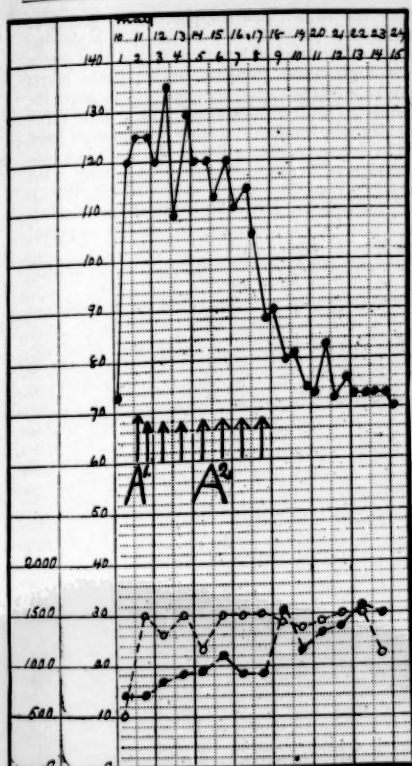


FIG. 7.—Patient with pulsus alternans. Dots joined by solid line indicate radial pulse rate. Dots joined by broken line indicate urine output in c.c. Circles joined by broken line indicate fluid intake in c.c. Arrow over A^1 indicates intramuscular dose of 1 c.c. of digipuratum. Arrows over A^2 indicate days on which the patient received three doses of 0.1 gm. each of powdered digitalis leaves.

If you use a single digitalis preparation which you know to be active by mouth and use it in a dosage which you have learned to be effective it seems to me you have solved the problem for all cases except those requiring intravenous or subcutaneous digitalis therapy, and these latter are few. If, in addition, you have chosen a potent preparation for these occasional requirements, it seems to me you are in a position to toss into the waste basket all samples and literature on improved preparations of digitalis. You can reduce it to two forms, one for mouth use and one for intravenous use, and get as good results as any of your colleagues if you select the suitable

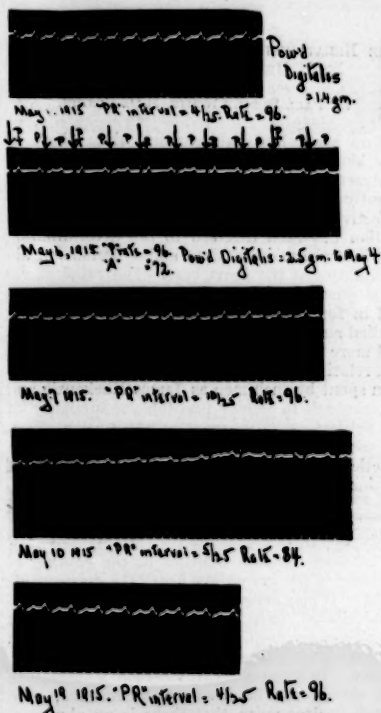


FIG. 8.—Electrocardiograms from patient with regular rhythm showing effect of digitalis on conduction time between auricle and ventricle. The second curve shows a partial block in conduction.

type of case in which to push your digitalis therapy. One good preparation for mouth use with common sense and a knowledge of cardiac pathology and physiology will suffice for the successful treatment of most of your cardiac cases.

I would suggest that you have a reliable druggist keep in stock for you in powdered form a good digitalis leaf whose efficiency you know from using it on your own patients. From this leaf have him fill your prescriptions of pills of powdered leaf or fresh infusion. Equally well might you use tincture, but its preparation requires considerable time. Insist that your patients have their prescriptions filled by this one druggist. Doing this I believe you will improve greatly the results you obtain from digitalis, and digitalis properly used in cardiac disease is a most effective remedy, an all-sufficient answer to those who have no faith in therapeutic measures.

II.

THE RELATIONSHIP OF THE ABNORMAL HEART BEAT TO PROGNOSIS.

BY PAUL DUDLEY WHITE, M.D., BOSTON.

THE heart beats abnormally when there is any abnormality of its rhythm, conduction, or contracting power. Sometimes all three and frequently two of these three cardiac functions are defective. During the past few years much attention has been directed to the determination and interpretation of signs and symptoms of abnormalities of the heart beat. The value of various phenomena in estimating cardiac damage and in forecasting the patient's future is being studied and this study should yield steadily more and more guides for our assistance. The field is still relatively recent, but enough years have now been spent by such men as James Mackenzie and Wenckebach to render profitable a summary of the subject as we know it at the present time. We may consider the abnormal heart beat most practically by taking up in detail disorders of rhythm, conduction, and contraction.

I. DISTURBED RHYTHM.

The most common disorder of the rhythm of the heart is the *premature beat* (the extrasystole of old). It may arise in auricle, ventricle or junctional tissues. (Fig. 1.) Mackenzie² claims that the premature beat adds practically nothing to his opinion of a case whether favorable or unfavorable. In a young healthy person a premature beat should not be a source of concern, even though it does mean that there is an abnormal irritability somewhere in the heart. People have lived comfortably through lives of hard work till old age with the constant companionship of premature beats for fifty years or more. Sometimes this irregularity can be traced to tobacco or to exhaustion and in these cases it will stop

when the causes are stopped. The finding of ventricular premature beats in old people who are growing short of breath or in younger people with high blood pressure or syphilitic hearts may be important, for here one may discover the significant *pulsus alternans* which not infrequently follows the premature beat in such cases.

The frequent association of the much less common type of premature beat—that arising in the auricle (Fig. 1b)—with auricular fibrillation and paroxysmal auricular tachycardia (including flutter of the auricles) causes one to regard this type as more important prognostically than the ventricular premature beat as a possible forerunner of more serious conditions.

Finally, there is a third and uncommon type of premature beat, that which arises in the junctional tissues between auricles and ventricles. This premature beat is unimportant and may be dismissed with the observation that it shows an irritable condition of the node of Tawara or bundle of His and may be classed prognostically with the ventricular premature beat. The differentiation of the types of premature beats is usually possible only by graphic methods.

Paroxysmal tachycardia (Fig. 2) is the next disorder of the cardiac mechanism to be considered, following in direct sequence after premature beats. It consists of a rapid repetition of premature beats, all arising in the same abnormal focus in the heart muscle. It is almost always auricular in origin and sometimes occurs in patients who later show flutter or fibrillation of the auricles. There are people who have paroxysms of tachycardia at intervals for many years and, provided the paroxysms are brief, enjoy good health. Here again, however, the heart muscle is shown to be irritable and to a higher degree than in the case of premature beats. The irritability often expresses itself only under some mental or physical strain. Without other signs of cardiac trouble than the paroxysmal tachycardia the patient may usually be reassured but warned against excesses.

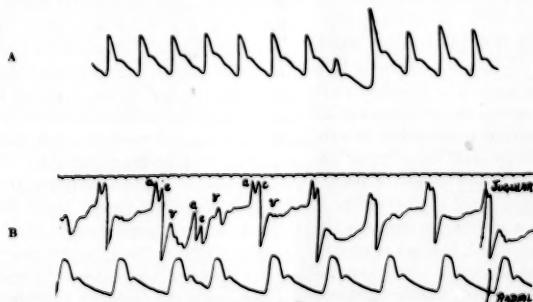


FIG. 1.

Radial pulse tracings showing premature beats.

A. Ventricular.

B. Auricular. Jugular pulse proves auricular origin of the premature beat.

Time interval = 0.5 sec.

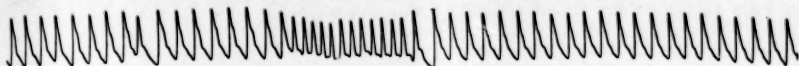


FIG. 2.

Radial pulse tracing showing a brief paroxysm of tachycardia. Preceding the paroxysm appears a ventricular premature beat. Time interval = 0.2 sec.

Closely associated with paroxysmal tachycardia is *auricular flutter*, which is an auricular tachycardia of high degree, almost always with heart block associated with it. The prognosis is less favorable than in the case of simple paroxysmal tachycardia, the evidence pointing as a rule to more serious myocardial damage. In some instances, however, patients showing this condition may live comfortably for years after their return to normal cardiac rhythm. Of seven cases of auricular flutter seen at the Massachusetts General Hospital during the past ten months (August, 1914, to June, 1915) two have died (29%), one had auricular fibrillation when last heard from, and the other four have had recurrences of the flutter. Of the last mentioned four, one has now an atrioventricular rhythm (that is, a pacemaker situated in the junctional tissues between auricle and ventricle), another has frequent ventricular premature beats and alternation of the pulse, a third has so many paroxysms of flutter that she is incapacitated, and the fourth, although in fair health, has shown auricular premature beats between attacks. In distinguishing flutter from paroxysmal tachycardia graphic records are practically essential.

Now we come to the most important disturbance of rhythm—the absolute irregularity of the heart in *auricular fibrillation*. (Fig. 3.) The prognosis in this condition is extremely variable, being dependent on the condition of the ventricular muscle, which must bear the brunt of the irregular passage of the impulse from the auricles, and also dependent on the response of the patient to digitalis therapy. From the moment of discovery of this irregularity until death any length of time, from a few hours to many years, may supervene. In 1881 Potain, by tracings of the radial pulse, found the presence of absolute arrhythmia in a young externe of the Paris hospitals; in 1913, thirty-two years later, Heitz² by polygram, found

the fibrillation still existing in this man after an active professional life during which the irregularity had never ceased. Of 86 patients with auricular fibrillation seen at the Massachusetts General Hospital in the past ten months (August, 1914 to June, 1915) 14 (16%) are known to have died. Five are now living comfortably who have suffered in the past from the rather unusual paroxysmal type of fibrillation.

Sometimes a marked arrhythmia is produced through nervous influences acting directly on the pacemaker at the sino-auricular node. This so-called sinus arrhythmia usually is respiratory in origin, but may be due to factors such as increased intracranial pressure and to other causes not well defined. Although at times distinctly abnormal, this disturbance of rhythm as a rule has an extracardiac origin, and therefore should not impress one unfavorably with respect to the condition of the heart. Finally, disorder of the cardiac rhythm may be produced by heart-block, which should be considered under the second heading.

II. DISTURBANCES OF CONDUCTION.

All degrees of *heart-block* may be found from the simple prolongation of the interval between auricular and ventricular contractions, through the stage of dropped beats and 2 and 3 to 1 block, to the rare condition of complete heart-block. (Fig. 4.) Toxic block, usually transient, may be caused by digitalis and allied drugs, acute infection and asphyxia (shown experimentally). This type of block has little value prognostically, except in some cases to evidence a damaged bundle which has been easily depressed by the toxin. If the block is not traceable to toxic cause, but seems to be due entirely to disease or degenerative changes in the bundle, the prognosis must be guarded, for the block in such a case is but an

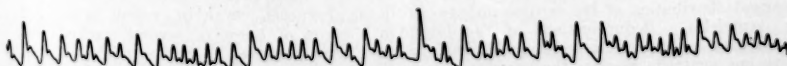


FIG. 3.

Radial pulse tracing showing the absolute irregularity of auricular fibrillation. Time interval = 0.2 sec.

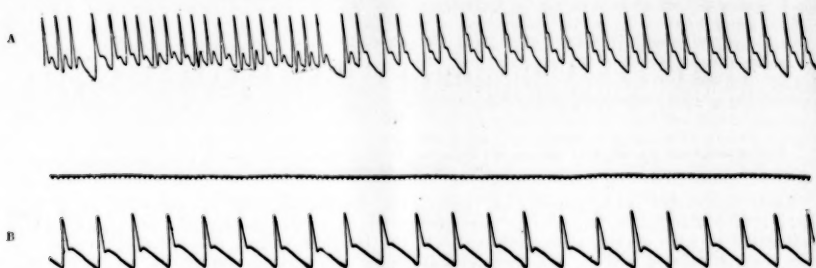


FIG. 4.

Radial pulse tracings showing heart block.

A. Partial block. Early in the tracing there is a "dropped beat." Later every third beat is dropped.

B. Complete heart block. Rate = 42.

Time interval = 0.2 sec.

index of widespread damage in the myocardium. The progressive nature of the destructive process may be followed easily in some cases by the observation of the evolution of the block itself from mild to more extensive grades. The Stokes-Adams syndrome is most frequent in partial heart block, with marked depression of the bundle at intervals. When the block becomes complete in such a case the patient may improve considerably and live comfortably for years. The prognosis of any case of permanent block, especially of the higher grades, should be regarded as grave, although in some instances years may elapse between the discovery of the block and death.

Not only may the main stem of the bundle of His be involved to produce a blocking of the cardiac impulse from the auricles, but also its branches, large and small, may be damaged. At present it is impossible to detect lesions of the smaller twigs of the conduction system in the ventricle, but it is possible by electrocardiograms to recognize gross defects of the two main branches, right and left, which go to right and left ventricles respectively. The left branch is involved much less frequently than the right. At the Massachusetts General Hospital, in the past eight months, of twelve cases of bundle branch defect only one has been of the left branch. The main stem of the bundle of His in such cases may not be damaged sufficiently to cause delay between auricular and ventricular contractions, and the pulse may be perfectly regular at a rate close to 70 per minute. (Fig. 5.) The hidden damage is, however, revealed by the electrocardiogram and is of considerable value prognostically. Any beats in which there is defective conduction in the branches of the bundle of His are called aberrant, thus indicating the abnormal distribution of the cardiac impulse in the ventricles. Reduplications of the heart sounds may accompany these branch lesions, in which one ventricle receives the impulse appreciably before the other. As in the case of lesions of the main stem, so lesions of the branches of

the bundle evidence widespread myocardial damage and are found usually in sclerotic hearts. Two of the twelve patients with branch lesions at the Massachusetts General Hospital have died within eight months of the time when the lesions were discovered; several of the survivors are in poor condition at the present time.

III. DISTURBANCES OF CONTRACTING POWER.

Finally we come to abnormalities of the contracting power of the heart. Weakness in the contraction of the heart muscle is often associated with defects in rhythm and conduction. The coexistence of considerable abnormalities of two or of three of these properties of the heart increases the gravity of the prognosis (for example, heart block or arrhythmia combined with myocardial weakness). Defect in the contracting power of the heart may itself be enhanced by disturbance of the rhythm, as in the rapid irregular action of auricular fibrillation. Help may come on the other hand if the conductivity of the heart is defective—such defect may be artificially produced through the administration of digitalis. In the estimation of myocardial exhaustion the symptoms and general physical signs of the patient taken collectively are of much value and are generally used as the criterion of the cardiac condition: dyspnea on exertion, weak heart sounds, edema of extremities and lungs, and cyanosis. But the history of the frequency of "cardiac breaks" and the way in which the patient reacts or has reacted in the past to rest and digitalis must control one's prognosis.

It is in the doubtful cases showing little else than arrhythmia, palpitation or slight dyspnea on exertion that oftentimes one is most interested in the prognosis. Swan⁴ in a recent investigation, in a series of cases, of several methods which have been proposed as guides in the determination of incompetence of the myocardium in doubtful cases, concludes that two of the methods have more value than the others, namely

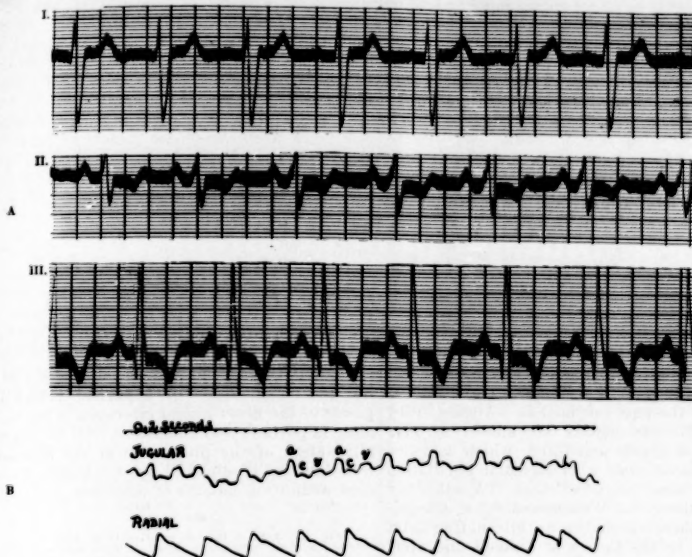


Fig. 5.

Graphic records from patient showing defective conduction in the left branch of the bundle of His.

A. The three electrocardiographic leads.

B. Radial and jugular tracings, showing an absolutely regular pulse with slightly prolonged a-e interval.

Time interval = 0.2 sec.

Tigerstedt's efficiency factor, which is found by dividing the systolic pressure multiplied by the pulse rate into the pulse pressure multiplied by the pulse rate, the other method being the determination of the percentage of pulse pressure formed by the second auscultatory phase. He considers as abnormal figures of 40% or more in the former and 30% or less in the latter test. It is very doubtful, however, whether these methods will prove of real worth; in some cases at least they are contradictory and in others far from convincing. Continued study of the blood flow in the determination of the time volume of the heart beat may yield in the future indications of value in the estimation of the efficiency of the heart.

Moritz³ has recently summarized the present status of clinical signs of beginning heart weakness, and concludes that nearly all signs or symptoms taken alone have little value, and that one must study a case from all angles in order to make a fair estimation of the heart's strength. He does not consider the size of the pulse or the blood pressure as reliable signs which can be interpreted at present. He is inclined to lay more stress on venous pressure as evidence of stasis, on the persistence (especially during sleep) of increased pulse rate following exercise, on nocturnal dyspnea, on the gallop rhythm of the heart, and on abnormal sensations in chest and arm. He pays little attention to the character of

the pulse because of its considerable modification by local conditions of the artery. On the other hand there is one condition of the pulse which is an important evidence of exhaustion of the myocardium—that is the variation in force of the pulse beats found either with absolute irregularity in some cases of auricular fibrillation or alternating regularly in some cases with normal rhythm. In the first instance the arrhythmia itself points to an abnormal heart, but in the second the pulse may be perfectly regular or interrupted only occasionally by ventricular premature beats. The alternating character of the force of pulse waves is best seen on radial tracings and gives the condition its name of *pulsus alternans* (Fig. 6). Alternation of the pulse is one of the most important signs which we possess of defective power of contraction of the heart and has been shown by Mackenzie and others to be of very great prognostic significance in cases not showing paroxysmal rapid heart action at the time (in such cases there may be temporary exhaustion from the rapid rate). The alternation may exist in individuals obviously mortally ill but also in cases in which one sometimes would doubt the presence of myocardial weakness. Patients who show *pulsus alternans* usually survive but a few years at the most, the longest case on record being one of Tabora's⁴, living six years after the alternation was first discovered. Of 83 patients with *pulsus alternans*

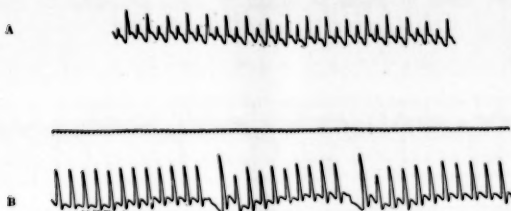


Fig. 6.
Radial tracings showing alternation of the pulse.
A. Constant pulse alternans.
B. Post-premature beat alternation.
Time interval = 0.2 sec.

and heart-rate below 125 and as a rule below 100 per minute, seen at the Massachusetts General Hospital in the past ten months (August, 1914 to June, 1915) twenty-six are known to have died—that is nearly one-third, which is twice the death rate of cases with auricular fibrillation during the same length of time. Whether we accept the theory of Wenckebach, that alternation of the heart is due to an alternating total hypostole, or the theory of Gaskell and Hering, that it is due to an alternating partial asystole resulting from the prolongation of the refractory phase of the muscle fibres, at any rate we can feel certain that the *pulsus alternans* is evidence of defect in the contracting power of the heart.

SUMMARY.

Of disturbances of the rhythm of the heart beat, auricular fibrillation (absolute irregularity) and auricular flutter have the gravest prognosis, for not only are these conditions indices of myocardial damage, but they themselves increase the difficulty of the circulation by their rapid driving of the heart. Sometimes, however, many years may elapse before the death of these patients. Of 86 cases of auricular fibrillation seen at the Massachusetts General Hospital 16% are known to have died within ten months of discovery. Premature beats and paroxysmal tachycardia are compatible with a long and active life, but their frequent association with cardiac damage should lead one to be a little cautious in prognosis.

Permanent damage to the atrioventricular bundle of His or its branches is evidence of widespread damage to the myocardium. Hence the prognosis of a patient showing such a condition should be guarded.

Defective contraction of the heart as shown by familiar symptoms and signs, has a prognosis dependent on the number and degree of these symptoms and signs, plus a consideration of similar trouble in the past and of the way in which

the heart responds to rest and digitalis. Of all the individual signs of abnormal contracting power of the heart *pulsus alternans* is one of the most important and consistent. Of 83 cases of alternation of the pulse seen at the Massachusetts General Hospital 31.3% are known to have died within ten months of discovery.

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III.

THE TREATMENT OF HEART DISEASE.

By F. C. SHATTUCK, M.D., BOSTON.

THE treatment of heart disease, the subject assigned to me, is no small one. Respecting, therefore, time and place, it will be my effort this afternoon to deal with principles rather than details. Congenital heart disease I shall not discuss.

The treatment of heart disease.

In the first place, we rarely treat heart disease. In rheumatic endo-pericarditis we use the salicylates, though, at least as far as my experience goes, they have no such control here as they have over rheumatic arthritis. If I am right, a possible explanation may lie in the fact that the heart cannot rest as the joints can. Some syphilitic hearts are greatly benefited by potassium iodide. Which these are can be rarely known. We must try. With salvarsan in luetic heart disease I have no experience, my hospital life having closed three years ago. Dr. Sears tells me he has had brilliant results from its use in some cases, notably in aortitis, and in endocarditis of combined luetic and rheumatic origin. I trust we may hear more on this most important point. The discovery of the pale-faced spirocheta has greatly enlarged and clarified our knowledge of cardiac syphilis.

The weak heart, which may follow almost any form of acute infection, needs imperatively rest and time; the latter may be abridged by wise medication.

Were I to obey the letter rather than the spirit of the invitation of our distinguished chairman, I should stop here, inasmuch as, except as above stated, we do not treat heart disease, but patients with diseased hearts. Sometimes the patient occupies the foreground, sometimes the heart; but both are always there, interdependent, and the best results are obtained only when the claims of each are duly weighed and welded.

But let us pause for a moment. The first step in making a hare soup is to catch the hare. Before treating a heart as diseased, let us be sure it is such. A disordered heart may be in no way diseased, though a diseased heart may be also disordered, and then offer a very pretty problem as to which of these elements is pre-potent at a given time. Hearts remind me somewhat of boys. A boy may act like the very devil and yet be a good boy—yes, a first-rate boy. Such boys are to be cured by a study and change of their environment; disordered hearts in like manner, by searching out and removing near or remote foci of reflex irritation. I am led to touch on this point by having seen many patients dosed with digitalis, strychnia, etc., apparently solely because the heart was rapid, irregular or intermittent. A number of years ago, an eminent and valued member of our profession consulted me about his heart, which was troubling him, asking whether his was a heart to exercise or to rest. I decided in favor of exercise, and his vigorous condition today shows that my guess was happily right.

Allow me to pause another moment. The heart is a single organ, unlike the lungs and some of the glands total loss of one of which may not be really crippling. Like the lungs, the heart can never have absolute rest, as can the stomach. The healthy heart has an enormous reserve power and a wonderful capacity for adapting itself to changes, extrinsic or intrinsic, especially if such change is gradual in development. Its tolerance of insult is far greater than we realized until recently. Dr. Cushing tells me that after rifle shots through the heart, even the thin-walled auricle, recovery has taken place in the war now in progress. We can determine the condition of the valves with surprising accuracy, but the valves are passive, so to speak. It is the heart muscle which is active and vital, and its condition offers far greater difficulty of diagnosis. That this should be so during life is not to be wondered at, when we see the pathologist often hesitate with the heart in his hand, and fail to get adequate knowledge even with his microscope, as to why the heart gave out.

Let us now assume that we have a diseased heart to deal with. I was brought up to be chary of telling people that they have heart disease,

but I became convinced long ago that, while it is best to be frank as to the indisputable facts, we should be as optimistic as to the outcome as the facts will warrant. We can usually be very sure as to whether or not a heart is diseased in fact. How long a given heart will last is so often a matter of opinion, and therefore liable to great error. The patient should have the benefit of all the doubt. Even if compensation is good and the lesion apparently non-progressive, the patient should so live as to maintain myocardial nutrition. This he is far more likely to do if he knows, and in a broad way understands, the reason for so doing. Nowhere more than in cases of heart disease is the intelligent coöperation of physician and patient essential to the best results. In fully compensated cases direct treatment of the heart is practically never called for.

When compensation is inadequate the treatment of the patient does not lose in importance and may be easier to carry out, inasmuch as he better realizes the need of help—is more ill. But now treatment of the heart itself, direct treatment, is called for in addition.

Of myocardial failure there are all grades in degree and gravity alike. The cause of failure may be a most important factor in aligning treatment. There is thus room for great judgment and acumen. Mere routine, like a "man-hole cover in anger is ten times worse than hell."

The major marks of myocardial failure are edema, pain and shortness of breath. The latter is common to the first two, but may be the leading symptom, especially in cases of mitral disease at or near the margin of compensation. Let us consider edema and pain separately, in the hope of saving time.

The gravity edema of heart disease suggests dilatation of the right ventricle as a whole, and is usually secondary to mitral disease, with which aortic or tricuspid lesion may be combined. It is our aim to promote and restore, as far as may be, myocardial efficiency. There are, broadly speaking, two ways open to us:—

(a) The indirect—reduction of the load of the heart.

(b) The direct—stimulation of the heart power.

Under (a) comes first and foremost rest, to such a degree and for such a time as the individual case may seem to require. It is better to underdo at first, rather than to overdo, as err at times we must; but in non-fatal cases the time is apt to come when a measure of exercise promotes myocardial nutrition.

Moreover, is it not possible that a reason why mitral stenosis is so much more common in women than men is that non-active female life gives a better chance for smouldering inflammation to glue together the edges of the valve curtains? In passing I merely allude here to the obese heart, which we exercise at the same time that we reduce its load by diet and other means.

How blessed may be a narcotic or hypnotic in securing rest! Morphine is *facile princeps*. Massage, active, passive, and resisted movements, skilfully applied, may do vicarious heart work. Watery catharsis does not weaken the dropsical heart patient, and it may be well to explain this to him. I am inclined to think we are not always bold enough in our use of hydragogues. Serous effusions, if marked or obstinate, are to be tapped. Drainage of the legs by Southey's tubes or a modification thereof may be a help. In cases of markedly over-distended right ventricle, and in these cases cyanosis is usually pronounced, venesection up to a pint or more may be the first procedure indicated. The effect is sometimes almost miraculous. A dozen leeches, followed by poulticing their bites, may have a similar effect in relieving the right heart and be a substitute for venesection, if this is for any reason thought to be undesirable. One of the upper quadrants of the abdomen is a convenient place for leeching. Bleeding may pave the way for direct cardiac treatment, digitalis, which was of no use before relief of the right ventricle, manifesting its power thereafter.

In all cases of heart dropsy we watch closely the amount of urine and are apt to try to increase it. The dropsy is not only a measure of cardiac efficiency, but also a hindrance thereto.

The diuretic action of calomel seems to be due, at least in part, to its effect on the renal cells. I avoid its use for this purpose if I believe the kidneys to be subject to more than passive congestion. I have seen a single dose of calomel salivate a nephritic. As a cardiac diuretic I have been in the habit of giving three grains of calomel every four hours, enjoining special care of the teeth. Given thus, it does not seem to affect the bowels. If it acts on the kidneys at all it usually does so on the second or third day, though I have seen the effect first appear on the fifth.

The diuretic action of caffeine and its first cousins, diuretin and theocin, is thought to be largely of vascular origin, though a direct action on the heart itself, cannot, I think, be as yet absolutely denied. Diuretin, in my experience, has never been of avail in renal dropsies. In those of cardiac origin its effect may be temporarily very gratifying. I have been led to attach value to its action or failure to act in cases of cardio-renal dropsy as an aid in deciding whether the cardiac or the renal element is predominant at a given time.

The objection to the alkaline diuretics is that their use runs counter to the dry diet which is ordinarily desirable when the blood mass is too great. Fluids are to be limited, as far as is compatible with the comfort of the patient, and the resourceful physician will secure tolerance and a greater fluid restriction than the routinist. Otherwise, diet should be nutritious, easily digested, moderate in amount. Gastric flatulence is to be avoided or counteracted.

There are cases, and times in the course of

cases, in which I believe wine or spirits, wisely used, to be of real service. Alcohol, unlike the rapid cardiac stimulants, such as camphor, aromatic ammonia, and ether, has some food value—calories, in modern parlance.

Direct stimulation of the myocardium is ordinarily desirable or necessary in conjunction with efforts to reduce the load. The members of the digitalis group are diuretics only in so far as they act on the myocardium, increasing its power, and thus raising the blood pressure. It is to this group that we look for direct and lasting myocardial stimulation. At its head stands, of course, digitalis, the many preparations of which and the dosage, varying in size and frequency, I pass over, simply noting the advance in recent years in standardizing digitalis. The only other members of the group worth mentioning here are strophanthin and apocynum. I have known each of these to succeed after digitalis had failed. I know no digitalis preparation which can produce such a rapid effect as strophanthin and cymarin when given intravenously, and perhaps, also, intramuscularly. The latter drug I have never used.

As a rule, it seems to me better to give only one of the members of the caffeine or digitalis groups at a time, pushing the dose until either the desired effect is produced, or there is evidence that the system is under its influence. This I think a great therapeutic law, applicable broadly to all active drugs. Exceptionally, however, judicious combinations seem to work better than the single remedy. Let me repeat here that we can only guess as to whether myocardial change is of such nature and extent as to be possible of repair or compensatory adjustment. Therapeutically, therefore, is it not wise to assume that some measure of such power is present, and try to call it forth? Is there one of us who has not found himself mistaken in both directions? In the long run, it is better to err on the hopeful side.

(b) The second major mark of cardiac failure is pain—angina.

This, as contrasted with edema, is suggestive of degenerative change, usually of the left ventricle, perhaps very local, and is the result of impeded coronary flow, to which spasm is super-added. Physical signs may be absolutely lacking, and diagnosis rest practically on a single symptom. I am inclined to think that angina is not recognized as often as it should be, some thinking that the pain cannot be of that nature unless agonizing. The pain is of all grades.

Although arteriosclerosis is common enough in hospital wards, we rarely there, or even in the out-patient department, see angina. The spasmodic element seems to be enhanced by a higher development of the nervous system than is common in hand workers. The treatment of anginal conditions falls into two natural divisions—that of the attack, mainly palliative, and that of the prevention of other attacks. A patient subject to angina should never be without a nitrite

ready for immediate use. I generally advise glonoin tablets as being, on the whole, more convenient. But amyl nitrite sometimes works better. It may be well to give a small dose before a necessary exertion, especially if this soon follows a meal, as a prophylactic against pain.

But the all-important therapy of angina, whether grave or relatively benign, is the regulation of the mode of life. The innocent and the grave cases vary more in prognosis than in therapy. Every effort should be made to avoid bringing on pain. In some cases it may be well to put the patient to bed for a week or two. Ordinarily, it is sufficient to limit activity to that which is compatible with comfort, remembering that upward inclines, a head wind, especially if cold, a full meal, straining at stool, venery and emotional vagaries are all inimical. More or less of these the intelligent patient finds out for himself. But it is our business to go into details, hoping through patient and persistent precaution to bring about, sooner or later, such adjustment or compensation in the heart as may markedly prolong life and render it very tolerable. Here, as in other aspects of the senile heart, the sum of small advantages may add up to very great therapeutic value. Diet, bathing, occupation, temperament, are all to be carefully considered.

It does not seem to me that tobacco should be absolutely and always interdicted. A sick man should not be deprived of any legitimate consolation, and the varying tolerance of tobacco by different people is notorious. A smoking doctor is likely to be more merciful than a non-smoker, but each should be on guard against his personal prejudices.

The details of medicinal treatment of true angina depend somewhat on its origin—whether this be infectious or non-infectious, and if infectious, whether of luetic or other origin. Medicinal treatment is usually of minor, though still of real importance. Strychnia is to be avoided as tending to heighten reflex excitability. Digitalis is indicated only in so far as myocardial failure is suggested by symptoms other than pain. Small doses of potassium iodide can seldom be harmful, and seem to be of value even in non-luetic cases. How far this value is suggestive in origin is hard to say. The average patient today is no less willing to carry out other directions when reminded three times daily that he is under medical supervision.

The action of glonoin is so transitory that its value between attacks is doubtful. If it be desirable, as I believe to be rarely the case, to try to secure constant reduction of blood pressure, sodium nitrite or erythrol may be used. With mannitol I have no experience.

The senile heart deserves a chapter to itself. An essential fact is that the changes which underlie it are degenerative, and tend to be progressive. We cannot hope for cure. Proverbially, we cannot add a cubit to our stature by taking thought. But we can add years of com-

fort and activity to life by taking thought for people with crippled hearts, especially if we succeed in inducing them patiently, persistently, cheerfully, intelligently to adapt their lives to their powers. For various reasons this may be, in whole or in part, impossible. We can only do our best. Pathetic, literally heart-breaking, is the case of the busy country practitioner with angina, dependent on his work for support, cranking and driving his own motor by night and day, at the beck and call of those far less ill than he.

DISCUSSION.

DR. JOHN SPROULL, Haverhill, Mass.: The duty of opening the discussion on the preceding papers was allotted to me by the chairman of this section. I do not think that there can really be any discussion, as far as difference of opinion is concerned, on the essential facts presented in either of the papers, so that the discussion can serve only to strengthen the presented ideas by perfect agreement or by presenting auxiliary facts and phenomena, showing the essentials from a different viewpoint. For that reason I can but state my own experience so far as related to the subject under consideration.

I do not know what influence digitalis has on the cardiac irregularity known as sinus arrhythmia, this being a physiological and not a pathological arrhythmia; I have not considered it of any importance apart from the question of diagnosis. I have not seen any benefit from digitalis in any form in premature contractions. I have many times, and do even now, occasionally try it out, believing that my observations, as to its lack of effect in previous cases, may have been fallacious, but I have always had to discard it as throwing an extra and useless load on the heart and digestive organs. My experience in pure paroxysmal tachycardia (of other than goitre origin) has been very limited, for in two years, I have seen but two genuine cases and neither was benefited by digitalis.

In heart block, I believe that in mild heart block, showing only some lengthening of the a-v interval, or an occasional dropped beat, associated with a weakened condition of the myocardium, digitalis may do good work, but in profound heart block, such as a three-to-one block, or in complete dissociation, I have not seen any benefit from its use, nor can I see the logic of its use in this condition. I have never been able to convince myself that any benefit could be derived from slowing a ventricle below 30 to 35 beats per minute, which is about the ventricular rate of complete dissociation.

I have had no experience with auricular flutter and very little with cases presenting pulsus alternans. Of the latter condition I have seen but three undoubted cases in two years and no benefit was derived from any drugs.

My experience with digitalis, however, is altogether different in auricular fibrillation, for it is

in this condition, above all others, that I have observed the most marked benefits from its administration. If one might talk of miracles, one might almost feel that in this cardiac irregularity digitalis works miracles. I have known its effect to be most marvelous, rescuing people who were almost moribund.

Its mode of action and its proper administration are so closely associated that one cannot discuss the one without touching more or less on the other.

Most cases of auricular fibrillation are seen in the condition of so-called dilatation of the ventricle, and how this condition of dilatation (which I believe is synonymous with exhaustion and loss of tonicity) is produced gives us some clue to the action of digitalis in this arrhythmia. The condition of dilatation of the ventricle is produced by the response of the ventricle to the excessive number of erratic stimuli originating in the auricle, and the action of digitalis would seem to be that of giving rest to the ventricle, either by blocking the passage of erratic stimuli by a selective action on the bundle of His, or by prolonging the refractory period of the ventricular muscle during diastole or by a combination of both methods. At least one may say that by digitalis the response of the ventricular muscle to the erratic stimuli originating in the auricle is prevented and the ventricle thus is rested and given an opportunity to recover its tonicity.

In the clinical use of digitalis, sufficient doses should be given to reduce the ventricular rate to somewhere near the normal and digitalis should be continued in dosage sufficient to maintain the normal ventricular rate, whether this entails its administration four times a day or once a day as long as the individual lives. By this method only can we, in my opinion, get the full benefit from the administration of digitalis, for auricular fibrillation is an incurable condition and the best we can do is to prevent its evil influence on the ventricle, and that we can often do by the continued administration of digitalis. It is well to remember that as far as we know at the present time digitalis does not have any such influence on the fibrillating auricle as it has on the dilated ventricle, and an auricle fibrillation once established is usually present for life, and that digitalis is useful not only as relieving the exhausted condition of the ventricle, but also in preventing the recurrence of this condition.

The prognosis of the various cardiac arrhythmias from two aspects:—

First. As to the cure of the condition.

Second. As to its effect on the life of the individual.

I can only agree with everything that Dr. White has said and state my own experience in some arrhythmias.

Premature contractions are usually not of serious import, if this is the only form of cardiac irregularity present. The prognosis of them, as far as life is concerned, may be disregarded, but

the prognosis as to their cure and removal is not very good in my own experience. I have had, however, two cases where premature contractions came in such frequency and there were such clutters of them that I believed that they contributed greatly to an exhausted condition of the heart muscle.

I have not seen enough paroxysmal tachycardia or auricular flutter to be able to give you my own results.

Of pulsus alternans I have seen but three undoubted cases in two years and they are all dead. My experience with heart block is that the underlying condition of degeneration of the myocardium or the associated arteriosclerosis should govern the prognosis. I do not think that the mere presence of heart block, except in so far as it is an indication of injury to the myocardium, can influence the prognosis. I feel hardly competent to speak as to the cure of heart block in young rheumatic hearts, for it can be only after an observation of a great many of them, for years, that one can feel that there has been complete recovery.

In elderly people with heart block and even complete dissociation, I have a number who have passed through the period of convulsions and are now living out their allotted span in comparative peace and comfort. One of these individuals showed convulsions due to heart block at 84 and is now enjoying 86 years of life.

The prognosis of auricular fibrillation is very complex and is dependent mainly on the response of the individual to digitalis.

As to cure of the fibrillation—that is impossible, for as far as science is concerned, at present there is no known drug which will change an incoördinate fibrillating auricle back to a coördinate contracting one.

The prognosis, as to the life of the individual, depends on two conditions:—

First. Is the fibrillation an abnormal rhythm associated with organic changes in other organs, as the liver and kidney?

Second. Do moderate and infrequent doses of digitalis keep the ventricle in condition?

Obviously it renders the prognosis much more serious if, in addition to the fibrillating auricle, you have organic changes in the kidney or liver, interfering with the functioning of the cardiac muscle, and obviously, also, if digitalis does not prevent the evil effects of the auricular fibrillation on the ventricle, then there is at present no other successful method of doing so, and the prognosis, as to the life of the individual, is rendered correspondingly more serious.

DR. F. W. PALFREY, Boston: The papers of Dr. Christian and Dr. White show adequately the close scrutiny that has been brought to bear upon the study of heart disease in recent years. Hearts which were formerly grouped as regular or irregular have, as has been repeatedly shown today, been separated among the different types

of irregularity. It has been shown that sinus irregularity does no harm; that the extra systole in itself is comparatively unimportant. Paroxysmal tachycardia is in doubt. Auricular fibrillation and flutter, heart block and alternation are of serious importance. But in considering these types of irregularity I think it is still to be remembered that an irregularity, like a valvular lesion, is only a factor in the total incompetence of the heart, and that it is from disturbance of contractility or tonicity, under which comes the dilatation of the heart long recognized, that cases of heart disease in majority die. Many heart cases die without incoordination of their chambers. Many cases of auricular fibrillation improve greatly, even though the auricles continue to fibrillate.

In decompensation with lessened ability of the heart to contract and loss of tonicity, the contraction of the heart at a disadvantage from distention of its chambers is a factor which should not be disregarded. In this connection I was glad to hear Dr. Shattuck's emphasis upon the value of venesection. Venesection is a measure which was formerly much used, but since its discontinuance following Virchow's condemnation of it in pneumonia, I am quite sure that the use of venesection outside of hospitals, and perhaps even in them, is too infrequent. Venesection perhaps has become a measure against which there is popular prejudice. But those who have used it in acutely incompetent hearts I think will agree with me that it is a measure which ought to be emphasized and more widely used than it is.

Dr. JOSEPH H. PRATT, Boston: I think that many of us do not realize the frequency of these conditions which we have heard discussed this afternoon. The terms used—auricular fibrillation, auricular flutter, extrasystoles, and pulsus alternans—are new, but the conditions are old, and we have all seen many examples of them, but they passed unrecognized because we did not use the newer methods of study. Now, I made an interesting clinical investigation this spring with the aid of four senior students. In the outpatient department of the Massachusetts General Hospital, through the courtesy of the staff, I was allowed to examine and study all cases with suspected heart disease admitted to the male and female medical rooms. During a period of two months we made routine examinations with the polygraph and the telerradiograph, and through the cooperation of Dr. White many of the cases were examined with the electrocardiograph. During that period we saw and examined a hundred and fifty patients with cardiac disease, and among these we found no less than sixteen per cent. with auricular fibrillation, sixteen per cent. with extrasystoles, two per cent. with auricular flutter, four per cent. with pulsus alternans, and ten per cent. with delayed conduction or partial heart block. There were fifty-eight cases, that is, over thirty-three and a third per cent. of all the patients that came there, who

had arrhythmia of one sort or another. In forty-one per cent. of these cases, the irregularity was due to auricular fibrillation.

Now these figures show the frequency with which these conditions occur in ordinary daily work. Many of the patients had slight evidence of cardiac disease. I remember very well the first day of our work, a woman came in who was slightly short of breath, but on the ordinary physical examination nothing abnormal was found about her heart. Simply as a routine procedure I made a polygraph-tracing and found there was delayed conduction. This observation was confirmed by Dr. White with the electrocardiograph. The delayed conduction meant that the patient had a myocardial disease and justified the diagnosis of chronic myocarditis. This could not be recognized in any other way.

I think that the polygraph should be used by every physician who intends thoroughly to study his cases of cardiac diseases. With a Dudgeon-sphygmograph provided with a time marker, a great deal of information can be obtained which is impossible by palpation of the radial pulse. Dr. Christian justly emphasizes the importance of educating the finger to recognize auricular fibrillation, but he must admit that there are some cases of auricular fibrillation in which the interval between successive beats is so slight that it cannot be recognized by the unaided finger. In the diagnosis of pulsus alternans, a radial pulse tracing is necessary because many of the cases of pulsus alternans will not be detected by the palpating finger. Dr. White has clearly shown that the recognition of pulsus alternans is important, because this condition indicates a serious weakness of the heart muscle. With the polygraph, delayed conduction from the auricle to the ventricle can be made out, and this may render possible the diagnosis of acute or chronic myocarditis that might otherwise escape detection.

The frequency of myocardial disease was another point brought out by our study. It was only a few years ago that teachers and text-books paid very little attention to myocardial disease in the absence of valvular disease. By the use of modern methods, we found that primary myocardial disease, with intact valves, is far more frequent than is commonly thought. There were no less than sixty-three cases of cardio-sclerosis in our series. Only seven of these had nephritis. There were more cases of primary myocardial disease than of valvular disease.

I think the recognition of pulsus alternans, which occurs frequently after extrasystoles, as Dr. White has shown, is of distinct value in diagnosis and prognosis. If I am not mistaken, he has observed more cases of pulsus alternans than any other investigator has reported.

Just a word in regard to treatment. Dr. Christian has shown very clearly what digitalis in large doses can accomplish. He has used from the opening of his clinic active preparations of digitalis, and in larger amounts than have been

employed by most of the physicians in this vicinity. In 1910 I reported before this section a study of the preparations of digitalis used in Boston in the hospitals and dispensed by leading druggists. These were carefully tested physiologically in the laboratory and only one single specimen was found that was active in the ordinary doses. At that time I called attention to the titrated powdered digitalis leaf prepared by Caesar and Loretz of Halle, Germany. I have found it as satisfactory as digipuratum for general use and far less expensive. I should like to know what preparation Dr. Christian is now using. In private, as well as in hospital practice only preparations made from active digitalis leaf of known strength should be used.

DR. CHRISTIAN: In regard to the question of Dr. Sproull, as to whether digitalis will stop pulsus alternans, usually no, sometimes yes. The patient who responded so well to digitalis, whose chart and tracing I showed you, had marked pulsus alternans on the 11th. The chart began on May 10, and I took tracings of the patient on yesterday, and there is no trace whatsoever of pulsus alternans. That is the exception. Usually the pulsus alternans will resist the digitalis, but the heart will become functionally more efficient, except in those cases in which the myocardial disease is extensive, and I spoke of this in cautioning one against pushing digitalis when a patient of this group is not under close observation, on account of the occasional rapid change from therapeutic action to marked toxic action. Usually the digitalis does not do away with the pulsus alternans.

In regard to the venesection that Dr. Shattuck and Dr. Palfrey spoke of, I should like on my part to emphasize that as a very important procedure, and point out to you the great ease with which you can bleed a patient at the present time. With the methods that we use for obtaining blood for a Wassermann reaction it is possible to bleed a patient without any incision and practically without any pain. You can bleed a patient four or five hundred c.c. with the utmost ease, and if you have any doubt as to whether you should make your patient anemic or not, don't bother about it. It is quite possible later to transfuse the patient, and restore the amount of blood if necessary. There are a great many immediate advantages in venesection.

In regard to Dr. Pratt's question as to the preparation of digitalis which we use. We used Caesar and Loretz's standardized digitalis leaf, but it became a little more difficult and expensive to obtain than on account of the war conditions, although it is still possible to get the preparation. I thought it was worth while on our part to see what we could do with home products, so I had our pharmacist write to one of the well-known manufacturers of drugs and tell him that we wanted a specimen of powdered digitalis leaves, and we wanted him to send us an effi-

cient preparation because we were going to test it in the laboratory, and we were going to test it in the wards, and if it wasn't good we were going to send it back and would not buy drugs from him. The result was that the first bottle of powdered leaves, when we tested it out in contrast with Caesar and Loretz's preparation on frogs, seemed just a trifle less efficient, but really very little different. We used it in the clinic and got just as good results on our patients as we had gotten before with Caesar and Loretz's leaf.

We have reduced our digitalis therapy to very simple terms in our own clinic. We use but two preparations by mouth, powdered leaves and infusion. We use one preparation intravenously (strophanthin) when we want to get immediate effects, and occasionally, if for some reason we want to use a subcutaneous intramuscular dose, we use a third preparation (liquid digipuratum) for that. We do not use the tincture for this reason: the infusion can be made in a very short time. The tincture has to percolate for twenty-four hours after it begins to run, and this is a little bit more trouble and takes a little bit more time. I believe ordinary tincture that is put on the market is very often inefficient. If you know that a druggist has got a good preparation of powdered leaves of digitalis, send all your patients to that druggist and have him make up the infusion every time the patient brings his prescription, or make the pills each time. As far as the leaves are concerned, you can use them as powder to put on the end of the patient's tongue, to take down with water. Until we know more about the specific action of the various alkaloids that go to make up digitalis, and I don't think we know practically anything about them now, you can throw into the wastebasket all the literature about new digitalis preparations and stick to these three or four forms. If you select the proper kind of a patient on the basis of type of irregularity, and give your digitalis in sufficient dosage you will get such results that you will feel pretty confident that digitalis is a good effective drug, and one very well worth having at your beck when you have a patient to treat with cardiac decompensation.

DR. WHITE: I must take exception to one remark of Dr. Pratt's. I have records at present of eighty-three cases of pulsus alternans. In 1913 Mackenzie had records of over a hundred. I want to emphasize the importance of the finding of pulsus alternans as evidence of myocardial weakness. It shows damage, or at any rate exhaustion, of the myocardium of twice the importance of that shown by absolute irregularity of the pulse. That is, *pulsus alternans* is twice as significant an index of cardiac exhaustion as is the absolutely arrhythmic pulse of fibrillation of the auricles.

Reports of Societies.

TRANSACTIONS OF THE THIRTIETH ANNUAL MEETING OF THE ASSOCIATION OF AMERICAN PHYSICIANS.

Held at Washington, D. C., May 11, 12, and 13, 1915.

The President, Dr. S. J. MELTZER, called the meeting to order at 9.45 a.m., May 11th.

THE PRESIDENTIAL ADDRESS.

After reference to the deaths during the past year of Dr. Samuel C. Chew, of Baltimore, Dr. Morris Longstreth, of Cambridge, Mass., Dr. Geo. L. Peabody, Newport, R. I., and Dr. W. E. Fischel, of St. Louis, Mo., the address dealt with certain policies and tendencies within the Association and indicated dangers to be avoided and ends to be attained.

The remarkable work accomplished by the American Medical Association, notably through the Council on Medical Education and the Council on Pharmacy, was alluded to and a plea made for more active participation by greater numbers of men of the true scientific spirit in the organization work of the American Medical Association as well as in the scientific work of the Sections.

The American Medical Association had come to exert a most remarkable influence upon the medical profession of this country, and its Journal had grown to be one of the best medical periodicals in the world. What had the Association of American Physicians contributed to this attainment? So far as the speaker could observe, nothing more than the indirect stimulus of its mere existence.

Reference was made to the changed scope of the Association's work; whereas it formerly obtained its broader point of view by virtue of its contacts with other units of the American Congress of Physicians and Surgeons, now the Association itself had the advantage of numbering in its membership not only internists, but also pathologists, bacteriologists, physiologists, pharmacologists, hygienists, and men interested in the public aspects of preventive medicine. This proved to be not an unmixed blessing; the program too often contained titles far removed from practical medicine and more appropriate for presentation elsewhere. Papers presented before this Association should always be distinctly related to clinical medicine; no papers should be presented unless related.

But, with all its bright future, clinical medicine will not gain its best advantage except by the close cooperation of clinicians and investigators. Diseases are experiments which nature makes on men and beasts. The expressions of disease, the steps of these experiments in nature, as observed by trained interpreters, will always be the best teachers of future physicians.

Clinical medicine does not consist of diagnosis and therapy alone. Great physicians are often great investigators also; unless this were so we should not now speak of Graves' disease, of Bright's disease, of Addison's disease. It was the physician Oliver who first noticed the rise of blood pressure after the administration of adrenal substance; but it was his cooperation with physiological chemists that resulted in the identification of adrenalin. It

is thus that the cooperation of both kinds of workers will assure the future of the Association.

Some have objected that the papers tend to go over their heads; but the program usually represents the present stage of medical progress, and if the papers go over the heads of any, the fact merely demonstrates that these have ceased to progress. Thus, the objection is not a valid one, otherwise all progress ceases.

After the transaction of business, the scientific program was taken up.

1

"The Anatomical and Histological Expression of Increased Resistance towards Tuberculosis in Vaccinated Cattle." By THEOBALD SMITH, Boston, Mass.

GROUP ON CIRCULATION.

2

"Important Contributions to Clinical Medicine during the Past Thirty Years from the Study of Human Blood Pressure." By THEODORE C. JANeway, Baltimore, Md.

Clinical observations upon blood pressure in man had not been made at the time of the foundation of this Association.

In Flint's Practice of Medicine, published in 1886, there is a passage referring to an increase of blood pressure in cases of small granular kidney and in cases of apoplexy. This showed an appreciation of the problem from facts learned by the unaided senses. A little later, Delafield, in this Association, spoke of cases with arterial narrowing, with increased intravascular tension, but no measurements of pressure were alluded to. In 1889, Stengel read a paper on Athletics, but there was no mention made of blood pressure observations.

In 1903, Cabot presented observations on blood pressure in man, and in 1904, there was a second paper by Cabot on observations of blood pressure by the sphygmomanometer. Since then the programs have always contained some titles bearing on this subject.

What has been the real gain? There has been developed an easily available method by which any physician can gain by measurement essentially accurate information concerning both the systolic and diastolic pressures in the arteries.

A sketch of the development of the sphygmomanometer was given, together with the notable names connected with the development of present knowledge of the subject.

The development of this method of clinical study has revolutionized the diagnosis of chronic Bright's disease, in contradistinction to the statement in Flint's Practice that the diagnosis of chronic nephritis depends upon the urinary findings. It has made a clinical entity of essential hypertension, of cardiovascular disease. It has disclosed the high pressure of the eclamptic state, and the low pressure of amyloid kidney. It has revealed the curious fact that in aortic regurgitation the pressure is higher in the leg than in the arm.

The study of average human blood pressure in connection with life insurance statistics has constituted an important and distinctively American line of research; Fisher's statistics are most important and indicate the normal increase of blood pressure with age. The tendency is to agree with

Lauder Brunton and Cooke that 135 mm. to mid-life and 145 mm. thereafter mark the limits of normal maximum variations in man. We have learned, in individual cases, however, not to view hypertension with so serious a prognostic eye.

From the therapeutic standpoint, the recognition of the greater importance of cardiac conservation and adequate circulation than reduction of abnormally high pressure has been a very important contribution to our knowledge. The beneficial effect of digitalis in maintaining compensation in these states is also a valuable contribution. The study of the effects of caffeine, strychnin, and other allied heart stimulants in connection with observations of the blood pressure has resulted in disillusionment with respect to the value of these agents.

Perhaps the most important of all the contributions to clinical medicine growing out of the study of human blood pressure have been the theoretical considerations having to do with the origin and explanation of the degenerative cardiovascular diseases, and these considerations must continue to be the basis of further study.

"The Form of the Arterial Pulse in Man." By ALBION W. HEWLETT, Ann Arbor, Mich.

4

"Observations on Dyspnoea in Cardiac Disease." By FRANCIS W. PEABODY, Boston, Mass.

The observations were made to ascertain the rôle played by acidosis in the production of the dyspnoea of cardiac disease. The conclusions reached were:

a. Acidosis plays an insignificant part in the dyspnoea of simple cardiac disease.

b. Acidosis is a more important factor in the dyspnoea of cardiorenal disease.

The second conclusion might be expected from the facts that acidosis is often present in cardiorenal disease and that dyspnoea is often present in the absence of cyanosis. To these facts may be opposed the objections that the acidosis is usually slight and that the dyspnoea is clinically different from the dyspnoea of diabetes; in cardio-renal disease the dyspnoea can be compared with exercise dyspnoea.

In making the observations a respirator was used and, by rebreathing, the CO₂ content of the respired air was increased. The respiratory products were measured and the stimulating effect of CO₂ was noted. Respiration in most persons is increased so that pulmonary ventilation is doubled when the CO₂ reaches 4½% or 5%. In mild cardiac valvular disease, subjects behave in precisely the same way; in cardio-renal subjects, however, pulmonary ventilation is doubled when the CO₂ reaches 2½% or 3%. This difference in behavior is explainable on the basis that the reaction of the blood is more easily disturbed in cardio-renal disease on account of the high acidity induced by the acidosis. The experiments were further carried on to note the influence of alkalis in controlling the dyspnoea.

5

"Stokes-Adams Syndrome with a Remarkable Delay in the A-V Conduction Time." By W. S. THAYER, Baltimore, Md.

The woman upon whom the observations were made was 50 or 55 years of age, the mother of several children. She had suffered with attacks of dyspnoea for several years. After a series of attacks characterized by intermittent pulse, she became unconscious and the pulse became very slow. When seen by the writer she had a perfectly regular heart beat, rate 35 per minute.

Examination with polygraph indicated that she was suffering from a total bradycardia with the A-V wave 0.7 second in duration. Electrocardiograms were made which upheld the suspicions excited by the polygraphic tracings, viz.: that the heart was beating with one auricular to each ventricular contraction, and with the most remarkably prolonged p-r period of 0.68 second. After exercise, the pulse rate fell from 35 to 28 per minute and by polygraphic tracings the A-V wave was now found to be 0.8 second, and later the A-V wave reached the unprecedented duration of nearly 0.9 second.

It was desired to ascertain the effect of atropine but the patient was hypersensitive to the drug and its use had to be abandoned. There have been a number of similar seizures since but the patient has utterly refused to allow further study.

This case at first glance would seem to be one of ordinary heart block with dissociation; but on study it was found to be one of total bradycardia. So far as known, there is on record no other case with such a long pause between the auricular and ventricular contractions. Two polygraphic tracings taken 6 weeks apart with identical curves could hardly be a coincidence.

6

"The Present Status of the Electrocardiographic Method in Clinical Medicine." By ALFRED E. COHN, New York.

7-10

GROUP OF PAPERS ON THE DUODENUM.

11

"Neurology Today and Thirty Years Ago." By CHARLES L. DANA, New York, N. Y.

12

"A Review of the Advance in Our Knowledge and Treatment of Cancer in the Last Thirty Years." By FRANCIS C. WOOD, New York, N. Y.

Papers dealing with the origin and cause of cancer have been notable by their absence from the programs of this Association for a long time. It is interesting to note that Delafeld made an important contribution to the knowledge of cancer many years ago which remained unpublished until discovered by the writer in Prudden's laboratory. It described clearly and minutely the structure of a new variety of neoplasm which afterwards was recognized by the Germans and by them named chorioepithelioma.

Little has been accomplished since the early days of cancer investigation; many efforts have been made, but few discoveries can be recorded. The work of Virchow, Waldeyer, Thiersch has all published before 1885 and this work fairly settled the classification of malignant tumors. Since that time we have learned much more about the details of cancer, but there has been no advance in the clinical

knowledge of cancer, hence the need of study by the experimental method.

Perhaps the first step of advance to be recorded was from Sweden, where Jensen succeeded in the artificial cultivation of neoplastic tissues. He brought out many important points, but at once fell into the error of trying to find a means of cure by the production of an antiserum; he was not aware of the possibility of spontaneous cure of mouse tumors and attributed the recovery of some of his mice to the antiserum. This mistake was carried on by subsequent investigators and has been the cause of much lost time and labor. The next step was the observation by Gaylord of spontaneous recovery of mouse tumors; this observation was accepted by Jensen who admitted that the claims for his antiserum were probably based on similar recoveries. Gaylord observed further the subsequent immunity of such recovered mice to tumor inoculation. The paper made a plea for the general adoption of the valuable method of charting developed by Gaylord and his associates.

In 1905-1906 Ehrlich announced that mice have certain tumors which may be observed undergoing transformation into sarcoma. This transitional period covers about 50 days in mice, a period biologically equivalent to about ten years in man.

In 1908 Bashford noted the production of immunity against tumor formation by injections of tissue extracts.

In 1910 Russell showed that tumor production depends upon vascularization of tissues.

In 1915 Rous demonstrated that chicken carcinoma is transmissible by inoculation not only of the tumor tissue but of filtrates from such tissue. Rat and mouse tumors can not be thus reproduced.

Lambert and Haines have found that tumor cells of the mouse will grow in mouse blood and equally well in the blood of immune mice; thus showing that cancer immunity in the mouse is not a serum reaction.

Murphy, at the Rockefeller Institute, has destroyed the bone marrow of experimental animals by x-ray exposures and thereafter has been able to reproduce foreign tumors in such animals, thus suspending the rule that tumors will not grow in a foreign host. It may be inferred, therefore, that at least part of the natural protective mechanism against tumor formation is an attribute of the bone marrow.

Febiger has shown that tumor formation in the stomach of animals may be caused by feeding certain parasites. The writer's own work, however, has demonstrated that the same appearances may be provoked by the ingestion of various irritating substances.

Tissard has pointed out that squeezing or massaging mouse tumors will provoke the formation of numerous metastases, an observation with obvious significance.

This is the meagre fruitage of an immense amount of work; much more needs to be done and it must be done with the realization that the mouse is the test tube for the study of cancer and that all results must be rigidly checked up with all the known facts from whatever source derived.

The therapy of cancer has made no progress. Surgery is still the best hope we have. Radium and x-ray therapy are more and more disappointing. The x-ray cures are found to be after all merely remissions, the x-ray having done no more than to

provoke a temporary suspension of growth or to impose a very slow rate of growth.

13

"A Case Illustrating Some of the Limitations of Physical Examinations of the Thorax and also those of an X-Ray Examination." By FRANCIS H. WILLIAMS, Boston, Mass.

The case was presented to point out the fact that after the diagnosis of thoracic aneurysm has been excluded by physical examination, the x-ray plate may occasion a change of ideas; also, that after the diagnosis of thoracic aneurysm has been made from the x-ray plate, physical examination may alter one's opinion. In pulmonary tuberculosis, these same propositions may also be advanced.

Two radiographs were exhibited, both made from the same patient, one having been taken in 1899 and the other in 1915. While the x-ray diagnosis does not alone suffice for final conclusions, here is an instance in which a mass is disclosed which gives rise to no physical signs whatever. The diagnosis is still unmade.

GROUP ON BLOOD AND BLOOD DISEASES.

14

"A Method of Determining Total Plasma and Blood Volume." By L. G. ROWNTREE, N. KEITH, and J. T. GERAGHTY, Baltimore, Md.

and

"A Simple Method of Determining Variations in the H ion Concentration in the Blood." By L. G. ROWNTREE, McKIM, MARRIOTT and R. L. LEVY, Baltimore, Md.

Growing out of former studies on renal functional tests, two new methods of clinical investigation have been developed.

1. The determination of total plasma and blood volume.

The method consists of injecting into a vein a given quantity of a non-toxic, non-dialysable red dye; in 3 and 6 minutes, specimens of blood are taken and the degree of dilution of the dye determined. For this determination a standard is necessary and such a standard solution is prepared by securing some blood before the dye is injected, and diluting an amount of dye equal to the dose to 4% of the body weight, using for the diluent 1 part serum and 3 parts salt solution. When the blood is taken after the injection of the dye, the serum is separated, diluted and compared with the standard solution: from this point the calculation is easy.

Curves have been constructed to show the loss of the dye from the human circulation and it has been found to be only 1% to 2%. It leaves the blood of dogs very late. The dye cannot be found in the tissues and it is not believed that it goes into the blood cells, either red or white.

In duplicate determinations, figures have been obtained with results coinciding within 100 cc. The average figures in normal individuals indicate that the blood volume should be 85 cc. per kilo or about 1/12 the body weight.

In essential hypertension and in diabetes the blood volume has been found to be normal. In pregnancy there is a large increase in the blood mass which does not disappear until 7 to 10 days

after delivery. This would seem to be a physiological preparation for hemorrhage.

2. Determination of the H ion concentration in the blood.

The method consists of adding an indicator (phenolsulphonephthalein) to the dialysate of blood serum and comparing with a solution of known H ion concentration. The method of preparing the dialysate is described in the paper.

The normal figures for H ion concentration are 7.6 to 7.8. Many cases have been studied, among them 20 cases of acidosis, all of which have shown a concentration toward the acid side, as low as 7.0.

In experimental acidosis, the readings went as low as 6.7, at which point the animals died. In alkalosis, the readings may go up to 8.0 or 8.1 when the animal dies.

By this method the buffer values of the blood may be determined and in acidosis the buffer values are very low. It is an easy method to study both acidosis and alkalosis from the blood side.

15

"A case of Severe Anemia with Leg Ulcer." By JEROME E. COOK and JEROME MEYER, St. Louis.

16

"An Unusual Condition of the Blood in Primary Pernicious Anemia." By N. E. BRILL, New York.

17

"Metabolism Studies Before and After Splenectomy in Congenital Hemolytic Jaundice." By SAMUEL GOLDSCHMIDT, O. H. PERRY PEPPER, and R. M. PEARCE, Philadelphia, Pa.

The patient had a severe anaemia from birth with the later usual history. Metabolism studies were made both before and after splenectomy. The blood picture after operation showed marked improvement.

In general the studies indicated a tendency to lose N before splenectomy and to retain N afterward; the operation seemed to restore the capacity for nitrogen utilization. With respect to uric acid, there was a high elimination before splenectomy with a drop of 47% in uric acid output after the operation.

The utilization of iron has been said to be low before and high after splenectomy in such cases; the present studies indicated that the iron elimination before splenectomy was 50% above the intake of this element and that after the operation the iron elimination was greatly reduced. Moreover, after splenectomy there was a reduction of 90% in the urobilin elimination in the feces.

What do these figures mean? They seem to support the improved blood findings after splenectomy as evidence of the real benefit of the operation. Banti had two cases in which the difficulty in nitrogen utilization was noted and in the case here presented the same observation was made. In these blood diseases there seems to be engaged some toxic agent which interferes with the ability to build up proteins. Removal of the spleen seems to remove the toxic agent or the sources of it and in addition the hemolytic agent is removed as well.

18

"On Plasmapheresis." By J. J. ABEL, B. B. TURNER, E. K. MARSHALL, JR., and P. D. LAMSON, Baltimore, Md.

Among the many points of view from which one may study the minute structure of the blood, the relation of cells to plasma led to experiments which consist of the removal of the plasma of withdrawn blood and the return of the cells to the circulation, a process to which has been given the name plasmapheresis. The method is as follows: an animal is bled very freely, almost to fatal exsanguination, the blood caught in a solution of hirudin to prevent coagulation, diluted to double its volume with Locke's solution, centrifugalized and the supernatant plasma discarded. The cells are now diluted to the original bulk of blood with Locke's solution and restored to the circulation of the animal. In this manner one can replace a very large proportion of the blood plasma by a solution such as Locke's with no apparent injury to the animal; and this may be done repeatedly from time to time still without injury to the animal.

Tables are given showing the changes in blood count; changes in the protein of the blood, etc. Blood pressure estimations were made and it was found that the low pressure of the exsanguinated state was well restored upon the return of the fluid to the vessels.

In the work it has been found that leech extract is not toxic, at least to the extent in which we use it. But since the war, the supply of leeches has been interrupted and a manufactured hirudin has been tried; this product is very toxic, quantities as small as 10 mg. being sufficient to kill animals with symptoms of great shock.

19

"The Preservation in Vitro of Living Erythrocytes." By PEYTON ROUS and J. R. TURNER, New York, N. Y.

There are several practical purposes involved in attempts to preserve intact mammalian red blood cells: for culture materials in the cultivation of plasmodia; for readily available indirect transfusion material etc.

It is interesting to find why erythrocytes last such a short time outside the body in view of their relatively long life in the body. In the work herein reported, washed cells were first used, but were found to disintegrate very early. It was determined that the plasma exerts a protective influence on the cells; for while washing in the centrifuge causes an injury to cells with the production of hemolysis, the addition of citrated plasma prevents this injury. It was found also that gelatin in the proportion of 1% in Ringer's or salt solution will protect the cells for a long time. Cells were tested by shaking to compare their fragility when thus treated with their fragility to hypotonic salt solution: there was no relation between the degrees of fragility, though bloods differ in their behavior in this regard. Human blood cells can be washed without injury.

Cells are protected but not preserved by gelatin; the addition of glucose or saccharose, however, to gelatin Ringer's solution will preserve the cells for a long time.

Cells that have kept several weeks take up and surrender oxygen normally; do not clump or show morphologic change; behave normally in the Wassermann reaction: are these cells really alive? Rabbits were exsanguinated and preserved blood used to supplant that withdrawn; the animals were fully restored and behaved normally after the operation. Many tests corroborated this experience. Rabbit

blood can be kept alive at least two weeks. Human blood can be kept for several weeks in dextrose-gelatin solution.

20

"Clinical Studies in Blood Transfusion." By E. LIBMAN and R. OTTENBERG, New York, N. Y.

The studies have been made in various forms of disease.

In the simple hemorrhage, the results of transfusion were uniformly good, especially in hemorrhage of gastric and duodenal ulcer. Transfusions made during the progress of the hemorrhage acted equally well as when made after the accident, and seemed to encourage spontaneous arrest of the effusion.

In six cases of dysentery, transfusion was followed by marked improvement.

In seven cases of typhoid hemorrhage, nine transfusions were done with two recoveries.

Transfusion is useful in operative work, both before and after operation; but it is of no help in surgical shock.

In purpura hemorrhagica, transfusion was done twelve times in nine cases; six cases recovered, the two deaths being in cases occurring shortly after pregnancy. In this disease, transfusion appears to have a direct curative value.

For hemophiliacs a donor should be picked in advance for possible needs. For prophylactic purposes a small transfusion every few months may be useful. Transfusion is much more helpful than the injection of serum.

For the treatment of postoperative hemorrhage in obstructive jaundice, transfusion was not of material benefit. The suggestion was made that in this condition there should be a preliminary bleeding with a large transfusion from several donors.

In pernicious anaemia and leukaemia the results were not uniformly good. In twenty-five cases of pernicious anaemia, fourteen showed for a time progressive improvement; eight of these are alive at the present time, but they all present evidences of blood trouble. In eleven cases transfusion was of no avail; two cases were also splenectomized without improvement.

The details of one case were given: in this case there were four transfusions, followed later by splenectomy; a remission then took place.

The conclusion was reached from all the experience that transfusion does more than anything else to abate the blood symptoms. It is important to try several donors when no improvement follows one or more transfusions from a single donor.

The effect of transfusion on the symptoms of pernicious anaemia were summarized thus: the appetite improves, the mental symptoms grow better, the glossitis clears up, and the blood picture improves; but the spinal cord symptoms do not improve. There is fever in 50% of the cases; some become afebrile after transfusion. The fever may be due to toxic causes or to the anaemia.

In this disease splenectomy is advisable; if no remission occurs after the operation, then transfusion should be done; or if remission does not follow transfusion, then splenectomy should be resorted to. We may thus determine the relative values of the two methods of treatment.

In leukaemia, there was some improvement following transfusion in a number of cases; but it was not lasting.

In acute infections, transfusion has no very large field of application. Patients may be helped along by it at times, but the best results are to be had in long continued subacute infections. In endocarditis with retention of infection transfusion does good only to the extent of prolonging life for a time.

The conclusion was reached that the Unger method of direct transfusion and the Weil citrate indirect method are the best and will supersede all others.

21

"The Progress Achieved During the Past Thirty Years in the Prevention and Treatment of Diphtheria." By W. H. PARK, New York, N. Y.

In the thirty years just past we have witnessed the growth and decay of the hope that by isolation and terminal disinfection the incidence of diphtheria might be reduced. There has been no such result except in the limitation of the spread of the disease in families and other small groups. The total mortality is just as high as ever, restricting comparisons, of course, to the antitoxin era.

Much work in other directions has been done meanwhile which brings us to another era.

Passive immunity we know will protect for a few weeks; 1000 units of antitoxin will confer immunity for about two weeks. We know too that this immunity may be repeated, but that its duration is curtailed after secondary injections. The short duration of passive immunity led to efforts to increase it. Three years ago Behring used a toxin-antitoxin mixture for this purpose. For 18 years producing laboratories have known that such mixtures were useful in speeding and increasing the antitoxin yield of horses. Theobald Smith suggested the use of this method in children, but Behring was the first to apply it. Other workers have, however, found limitations to the method in the fact that individuals who have no natural immunity are with great difficulty made immune, while indeed 25% of the natural non-immunes cannot be made immune at all. For practical purposes, passive immunity remains for the present the most used prophylactic measure.

Efforts have been made to see if bacterial vaccines would increase immunity, but with little success. Tests by fixation and by agglutination showed few antibodies. Present efforts have to do with attempts by the combination of toxin-antitoxin and vaccine therapy to increase both antitoxic immunity and antibody immunity.

In antitoxin therapy, we began with weak units and moderate doses; as the units have grown stronger, physicians seem to have correspondingly increased the dosage. Recently there has been much variability and uncertainty as to dosage and it is the fashion in some localities to give exceedingly large doses. It would seem that physicians have a very hazy idea why they employ a given dose of antitoxin. It is not well known that antitoxin is slowly absorbed and that it persists in the body a very long time. It has been shown that instead of any necessity of giving large doses of antitoxin to combat increasing doses of toxins as a matter of fact there are seldom present at one time more than 100 units of toxin even in the most severe cases. In fact it may be said that 1000 units of antitoxin given intravenously has an equal effect to 30,000 units given under the skin. The inference

from this statement is patent, and occasionally the intravenous method of administration should be used; but so far as the life of the diphtheria patient is concerned, only in a few cases can it be shown that the method of administration of antitoxin is of much moment. The Schick reaction aids in the appreciation of the effect of antitoxin. A single dose of antitoxin should be sufficient; a second dose is a reflection on the first.

With regard to prophylaxis it should be remembered that Schick has found that one half of the people will be found protected against diphtheria by natural immunity.

22

"Present Status of Specific Treatment of Epidemic Meningitis." By SIMON FLEKNER, New York, N. Y.

23

"The Treatment of Tetanus by Antitoxin Given Intraspinally." By MATTHIAS NIOLL, JR., New York, N. Y.

(Journal A. M. A., June 12, 1915.)

As successful as antitoxin has been in the prophylaxis of tetanus, it has been disappointing in treatment. One reason for this is that the diagnosis is usually made too late.

The prevalent advice heretofore has been to give a large intravenous dose of antitoxin, with later subcutaneous injections. This method has been very disappointing in practice, as has been said.

Experiments were made to ascertain the value of intrathecal administration of antitoxin. Guinea pigs were given twice the minimum lethal dose of tetanus toxin; they died in three days. Pigs treated thus were given antitoxin by injection into the heart cavity; they died in 5 to 8 days. Tetanic pigs treated by injecting antitoxin into the sciatic nerves did no better. But pigs treated by injecting 1/30 the dose of antitoxin used in the other animals into the spinal canal recovered. Several pigs were allowed to grow so tetanic that they were twisted into grotesque shapes; out of six treated by intraspinal injections of antitoxin, three recovered.

Since these experiments there have been twenty human cases in and around New York City. All were treated with intrathecal injections of antitoxin and 16 out of the 20 recovered. The method of treatment recommended is to give 3000 to 5000 units into the spinal canal, diluting the serum 10 to 20 cc to make it thin and easily diffusible; posture is not required to assist diffusion. In addition, 10,000 units should be given intravenously. The intraspinal injection should be repeated in 24 hours and, if necessary, the intravenous injection should be repeated also. By this method the mortality of tetanus has been reduced to 20%.

24

"The Treatment of Acute Lobar Pneumonia by Specific Methods." By RUFUS I. COLE, New York, N. Y.

A specific therapy for acute lobar pneumonia has been an object of eager search throughout the life of this Association. Has any progress been made toward the discovery of a specific remedy?

The paper relates the steps in this direction from the work of Fränkel, who was able to develop a certain resistance in animals, to that of Morgenroth who observed the destructive effect of ethyl hydrocuprine upon pneumococci in vivo.

One of the baffling difficulties is the fact that it is necessary to know the exact causative organism active in a given case; moreover, if it is determined that the pneumococcus is the predominant organism, it is still necessary to determine the type of pneumococcus; for four large groups of this organism may be distinguished. The disease then cannot be regarded as a pathological entity but must be approached by a specific etiological study.

Much of the work upon the problem of the specific treatment of lobar pneumonia has been directed toward the development of a vaccine therapy, following the lead of Sir Almroth Wright. But study of the problem indicates that there are two immune processes to be reckoned with: A body or somatic factor and a serum or passive factor. Active immunization is best accomplished by the disease itself. Workers with sensitized vaccines have found that their apparently beneficial results have not been due to immunity invoked by the vaccine but to immune substances present in the vaccine. The literature shows no good results from vaccine therapy, and this may be the more readily understood since we have come to know that the use of pneumococci of type I could have no helpful influence in a pneumonia due to pneumococci of type II.

Attention has thus been concentrated on devising means for producing passive immunity. The paper gives facts based on animal experiments to show that there is good reason to expect good results in this way. Immune bodies have been found in animal sera long ago; but failures to accomplish much with these sera have been due to the lack of knowledge hitherto of the different types of organisms with which we have to deal; insufficient doses of organisms have been used in inoculations for the production of immune sera; and too little serum has been used in the treatment of pneumonia. It is now easy to recognize the different types of organisms and it has been done practically in a number of cases with the development of truly specific sera. Types I, II, III, and IV are recognized. It has been found impossible to produce an immune serum for type III, and the use of such a serum in type IV is impracticable because it is so variable. Thus serum therapy is reduced in application to cases due to pneumococci of the types I and II. Serum therapy in 46 cases of pneumonia due to type I organisms had a mortality of 8%; of the fatal cases 1 died of pulmonary embolism and 2 had treatment only a few hours before death. These cases, of course, are insufficient to prove anything; conclusions must be based on experimental evidence and not on statistical clinical evidence.

With regard to chemotherapy, it is known that sodio-oleates are antagonistic to the development of pneumococci, but it is not possible to use these substances therapeutically. Morgenroth has shown that ethyl hydrocuprine is specific against pneumococci; but in mice it is necessary to give a large dose—approaching the toxic point—and to give it very early. To give in man a dose proportionate to that necessary in successful experiments on mice, it would be required to exhibit about 70 gm., whereas the administration of 1.5 gm. has been known to cause amblyopia.

(To be continued.)

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EUGENICS AND PRESENT-DAY WARFARE.

THE application of the Darwinian theory of the survival of the fittest in the case of the individual to a race, as has been done by Bernhardt and others, that in war the stronger races survive and the weaker perish, the whole human race profiting thereby, may have been a tenable hypothesis in the time of the Germanics and the Goths. In those days of primitive warfare the weakest nations were destroyed and the strongest survived. When gunpowder was invented and man could kill his adversary from a distance, and later, with the advent of smokeless powder, without disclosing the location of the destructive agent, all this was changed.

The Chinese minister at Brussels is reported to have said to his colleagues just before the present war, "A cannon has no eyes." A gunner serving his cannon now gets the range from an aeroplane and drops a shell in a group of the

enemy five miles away. The chances are even that in this group the man of genius, the well groomed athlete of twenty, the mentally and physically fit will be killed as often as the stupid dolt who has barely passed the requirements for admission to the army. The poison gases injure all alike. Life in the trenches is responsible for serious mental as well as bodily harm in this long distance impersonal warfare of machinery and chemistry.

The bravest are placed in the front to lead the desperate charges and the rapid fire machine guns mow them down, the man who turns the handle of the gun having, perhaps, the minimum of fitness. The youngest men sustain the heaviest loss—those who have not yet become fathers,—while the older men, those over forty-five years of age, who have already raised as many children as they are likely to contribute to the state, are among the reserves, manning fortresses and coast defences and therefore exposed to no special danger. Thus the race must be propagated by the old men or by the physically or mentally unfit. Apparently at the present time war is national suicide.

It has been estimated that, if the European War lasts through next winter, France will have lost at least a million men either killed or so badly mutilated that they may be counted out of the history of the race, this million being made up of the very flower of the nation on the male side. In Germany and in Russia the same process is going on, on an even larger scale. England is raising an immense volunteer army and probably has at present about two and a half million men under arms. Although they are volunteers, the system of conscription in vogue in other countries not having been adopted in that country as yet, the army is made up of the best physical and moral force of the nation. It has been computed that of the 120,000 who fought at Ypres in October, comparatively few are left today to serve in the ranks. England has lost most heavily in the men of the upper and upper middle classes, who responded first to the call for troops. Many of the great families of the land have lost all of their male heirs and the English gentleman bids fair to become extinct.

Other factors to be kept in mind when considering the effects of war on the future of a people are the large numbers of illegitimate children that have been born in the immediate

vicinity of the military training camps; the inability of the soldier, because of his calling, to support a family, thus diminishing the birth-rate; and the known prevalence of syphilis and venereal diseases in armies.

W. L. B.

PSYCHOLOGICAL SELECTION OF WORKMEN.

MUCH of the reproach which has been cast upon psychologists because of the apparent aloofness of their science from the affairs of every-day life is in a fair way to be obviated. When we find the ordinary psychologic laboratory tests applied daily in a large factory with a resultant increased efficiency of its employees, we are justified in optimism in regard to the practical future of psychology.

The average efficiency expert concerns himself with how the workman does his work, such problems as waste motion, and unnecessary duplication of effort; but the manager of a certain large manufacturing corporation believes in studying the personal equation, the capabilities and adaptabilities of the workman himself. He applies the routine laboratory tests for quickness of perception, degree of attention, and capacity for retention, to the applicant for employment, and determines first whether or not he shall be employed and, second, what work will suit him best. The results obtained have been amazing. The daily capacity of the men loading pig-iron on cars has increased from twelve and one-half to forty-seven and one-half tons per man, and at the same time their pay was increased 60%, and they were allowed time for rest.

Even more striking than these results are those obtained in the case of the girl employees who examine steel ball bearings and pick out the defective ones. To secure the girls best fitted for this work the manager made use of a simple psychological test. He employed those girls who were quickest to recognize a letter shown for an instant. Having selected the most suitable ones, he shortened their working day by two hours, gave them a Saturday half-holiday, four recesses during the day for recreation and even allowed those who needed it to take two days off at the time of their monthly period. As a result he has 35 girls doing the work 120 did before, they get twice as much wages and their

work is more accurate, thereby saving the management much of the cost of inspection. It is hardly necessary to add that the employees take kindly to this system and are on the best of terms with their employers.

VACCINATION AND TETANUS.

THERE has been some tendency recently, in certain quarters at least, to suspect vaccination virus of being at times a source of tetanus infection, owing to the wide publicity which has been given to several cases of tetanus following vaccination. The anti-vaccinationists have, of course, made much capital of these occurrences, but they will find little comfort in some observations published by Dr. John F. Anderson, Director of the Hygienic Laboratory, United States Public Health Service, in the *Public Health Reports* for July 16. He has conducted researches for the past eleven years to determine what relation, if any, existed between vaccination and the cases of tetanus which now and then followed it.

Not to detail all his experiments, he failed to produce tetanus in monkeys and guinea-pigs, animals subject both to tetanus and vaccinia, even by vaccinating them with virus laden with tetanus germs. He examined enough virus to vaccinate two million individuals and failed to find any tetanus germs, although the methods used were demonstrated to have been always effective where the bacillus was known to be present. Moreover, the virus examined was later put on the market and cases of tetanus were reported following the use of some of it.

Dr. Anderson calculates that during this eleven-year period about 31,942,000 vaccinations were done and only forty-one cases of tetanus were reported, which in itself would be almost enough to brand them as coincidences. In the army and navy there were about 585,000 vaccinations performed from 1904 to 1913 with not a case of tetanus.

Dr. Anderson concludes, from his approaches to the subject from the above varying angles, that tetanus never occurs in vaccination proper and as a result of bacilli in the virus, but only by contamination of the vaccination wound, such as may occur in any wound not cared for properly.

TRICHINIASIS.

THE Health Department of the city of New York has called attention to an alleged increase in the number of cases of trichiniasis in that city, and while the disease is one that is not called for notification by the Sanitary Code, the department would welcome voluntary reports from physicians.

This disease may exist to greater extent than has been recognized, as the common use of uncooked meats increases with the growth of the population. The statement has been made that no examination of a carcass can make sure that the animal was not infected. Doubtless, some human cases are never recognized. Although the symptoms of muscle pain, followed by edema of the face, are well known, mild cases may easily be classed as rheumatism or typhoid before the microscopic search for eosinophilia and cysts is made.

Physicians know that the severity of the disease depends on the number of unskilled embryos swallowed. Those liberated from the meat by the digestive processes reach the adult stage in about three days, and within ten days have produced hundreds of young, some of which pass out with the feces, others penetrate the intestinal walls and pass into the muscles. The adults may survive as long as two months in the intestine and turn out many broods. These can be counted as the sole source of supply, as the young never develops to adult life in the intestine before passing through the muscle cyst stage.

A considerable quantity of raw pork and beef is eaten in this country, in mixtures called "salamé," "cervelat," "roulade," and raw smoked ham products. It would be well for consumers of these delicacies to know the danger and to learn "that two per cent. of all hogs are trichinous." The bulletin also quotes Dr. Osler as stating that "post-mortem statistics show that from one-half to two per cent. of all bodies contain trichinae."

MEDICAL NOTES.

NEW YORK DEATH RATE LOW.—During the week ending August 7, 1915, there were 1451 deaths as compared with 1314 for the corresponding week of last year. The respective rates were 13.04 and 12.28. Making allowance for increase in population of 1915 over 1914,

there was still an increase of 85 deaths. While there were no deaths directly from insolation, the deaths from diarrheal diseases were more numerous during the past week than during the corresponding week of last year. Heart disease, pulmonary tuberculosis and violence showed an increase. Considering, however, the fact that the temperature during the past week was the most unbearable that the city has experienced in a great many years, it is a source of gratification that the number of deaths was kept within the figures above given.

The rate for the first 32 weeks of 1915 was 13.78, as compared with 14.57 for the corresponding period of 1914.

METHODS OF FIRST AID TREATMENT.—During the past year a special committee of U. S. army surgeons in Washington have been engaged in an investigation of the problems of first-aid measures and material, improved methods of transportation of wounded and more efficient fixation of injured extremities, as applied to military surgery.

The necessity for this investigation was furnished by the deplorable lack of uniformity in the methods used, since these have been found to vary not only in the armies of the different nations now at war, but also in the different departments of our army and navy at home.

Careful testing of first-aid packages, dressings, drugs, splints and other material employed in the administration of first aid, as well as the study of the best methods of employing them, is expected to lead to the standardization of first-aid material and methods. These will be incorporated in a First-Aid Manual to take the place of everything that has been arbitrary and confusing in the past.

It has been suggested that the results of this investigation should be just as useful and far-reaching when applied to the demands of accident surgery in industrial pursuits, as to military surgery, since selection of the best and its standardization must needs lead to economy and efficiency.

A number of surgeons engaged in the practice of accident surgery in the service of large industrial enterprises, whose opinion on this aspect of the problem has been sought, were so impressed with the mutual benefits to be derived from supplementing the investigations of the army and public health service officers, with the wealth of practical experience of the corporation surgeon, that a movement was set on foot for a joint conference of the different services and with the object of crystallizing ideas and more clearly defining the problems involved.

This meeting was held on Monday and Tuesday of this week, August 23 and 24, at the New Willard Hotel in Washington, D. C.

RELEASE OF QUARANTINE IN MARYLAND.—Report from Washington, D. C., states that on

Aug. 16 the federal quarantine against foot and mouth disease was raised throughout Maryland.

LONDON DEATH RATES IN JUNE.—Statistics recently published show that the total death rate of London in June, 1915, was only 12.2 per 1000 inhabitants living. Among the several districts and boroughs, the highest rate was 18.3 in Shoreditch, a crowded eastern slum, and the lowest was 8.3 in Wandsworth, a populous suburb on the south.

A WELSH MEDICAL SCHOOL.—It is announced that a medical school, open to women as well as men, is to be established in conjunction with the University of Wales, probably at Cardiff. Hitherto there has been no Welsh medical school, and students from that country have gone chiefly to Edinburgh, Glasgow, Aberdeen, St. Andrews, or Manchester.

AMENDMENT TO THE WISCONSIN EUGENIC LAW.—It is announced that, owing to the notable decline in marriages in Wisconsin, since the enforcement of the so-called eugenic law, noted in various issues of the JOURNAL, the law has been amended to make its requirements less rigid, and permitting physicians greater liberty in granting certificates.

EDUCATIONAL WORK FOR THE PREVENTION OF BLINDNESS.—The National Committee for the Prevention of Blindness has recently issued a circular, describing what women's clubs and nursing organizations can do to prevent blindness. It was written in response to frequent requests from nurses and club women for guidance in initiating or continuing prevention of blindness work. It describes the method of treatment of ophthalmia neonatorum, points out the dangers of midwives, discusses the adequate care of eyesight of school-children; industrial accidents and wood alcohol, and follows each subject with suggestions for the proper regulation and supervision of these dangers on the part of the community.

MILITARY CAMP FOR MEDICAL OFFICERS.—There is held during August in Tobyhanna, Penn., a military camp for the training of United States medical officers of the organized militia and doctors of the United States army medical reserve corps, the latter of which number about 1500 physicians and surgeons. The course lasts seven days for each class and there are six classes.

"The chief duty of the medical department in campaign is to relieve the fighting forces from the burden of caring for the sick and wounded at the front. This means that transportation of immense numbers of disabled men must be accomplished by the medical department.

"Viewed in this light, it is readily seen that medical department administration in the field

requires a large measure of military talent in troop leading, and that unless the division surgeon can have the services of a real military force his efforts will result in chaos.

"It has been found in all armies that the wounded have a better chance of recovery if their treatment is postponed until their arrival at the base, where proper facilities can be provided for their care. The military surgeon at the front is most successful when he refrains from practising medicine and surgery and devotes his entire energy to rendering first aid and arranging for prompt evacuation to the rear of all of his charge.

"A surgeon possesses surgical judgment and is able to separate those who can from those who cannot be transported, and he is able to give satisfactory first aid. In all active particulars his duty on the firing line could be performed by a line officer. This explains the military axiom that a line officer would make a better military surgeon at the front than any civilian surgeon who has not received a military training. The definition of a military surgeon is a 'soldier who has specialized in surgery, sanitation and medicine.'

"The last few weeks of the camp at Tobyhanna will be given over to the instruction of militiamen who have specialized as field hospital and ambulance company commanders, but during the first weeks of the camp only general instruction has been given."

EUROPEAN WAR NOTES.

SURGICAL DRESSINGS FOR THE WAR.—A recent report of the surgical dressings committee of the New England branch of the National Civic Federation states that during the past year this organization has prepared and sent to Europe over 300,000 dressings for the wounded. These have been variously distributed as follows:—

"We have sent our dressings to the Princess Joachim Murat's hospital to Mrs. George Howland for a hospital at Montreuil, to the Baron de Luze Hospital, Benevole, to the American Women's War Relief Hospital at Paignton, to the American Clearing House for general distribution, to the French Wounded Emergency Fund, to the Belgian Hospital at La Panne, for Serbian sanitary relief, and for the St. John's Ambulance Association. This last depot, through which we have constantly sent supplies through the agency of Mrs. Clipston-Sturgis, we have found to be most business-like, reaching the hospitals in France sooner than by any other agency except that of the American Clearing House. Richard Norton was allowed to requisition our supplies from the St. John's depot and to have them forwarded direct to his ambulance corps in France. He wrote expressing the greatest delight that at a crisis when supplies were failing the French army, he was able to give them dressings which had been made here in Boston by your committee. It was

after this episode that we had very complimentary letters from the surgeon-general of the second French army, and from Lord Stanmore of the St. John's Association."

ITALIAN WAR RELIEF.—The president of the New England Italian War Relief Committee has issued the following appeal for funds:—

"This committee has been formed to aid in relieving the distress which the European War brings to non-combatant Italians. Our immediate purpose is to help the women and children left destitute by the call of their wage-earning husbands and fathers to the war. Some of these are families of reservists summoned to Italy, and live in this country; a much larger number are in Italy itself. The inevitable casualties on the field and in the hospitals add daily to the list of those left without support.

"In our work we are promised the assistance of the Italian ambassador at Washington, Count Vincenzo Macchi di Cellere, who gives the movement his cordial approval and consents to oversee the distribution of the funds. As our means permit, we shall extend the field of relief, always keeping in view the most pressing needs.

"We appeal in the name of humanity, which calls on everyone to succor especially the innocent victims of war. We believe also that many Americans, who acknowledge their debt to Italy for her service to civilization, and for the pleasure and inspiration which they have personally received from her, will welcome this means of expressing their gratitude.

"Messrs. Lee, Higginson and Company, 44 State Street, Boston, have kindly consented to act as treasurers of the fund, and to acknowledge through the newspapers the subscriptions received. Checks should be sent to them, payable to the order of the New England Italian War Relief Fund."

WAR RELIEF FUNDS.—On Aug. 16 the totals of the principal New England relief funds for the European War reached the following amounts:—

Belgian Fund	\$267,043.12
Italian Fund	1,579.10

BOSTON AND NEW ENGLAND.

BOSTON MILK AND BABY HYGIENE ASSOCIATION.—In a recent statement to the daily press. Mr. George R. Bedinger, director of the Boston Milk and Baby Hygiene Association, comments as follows on the work of the Association this season and during the past four years:—

"The managers and officials of this association are peculiarly gratified at the steady and rapid improvement of Boston as a safe place for babies. Four years ago this city ranked seventh among the ten largest cities in its record for the reduction of infant mortality, as measured by the baby death rate. Last year it had

risen to second place, tied with St. Louis, New York being in the lead. For the first half of this year it has a lower death rate than New York City. The number of babies cared for by the association has steadily increased, the number four years ago being 2827; in 1912, 3026; in 1913, 3421; in 1914, 4097; and for the first seven months of this year 3438. Indications certainly point to an infant death rate for 1915 below 100 per 1000 births, which, if attained, will be a new record for our city."

NEW ENGLAND CANCER DEATH RATES.—In the registration area of the United States the cancer death rate is 78.9 per 100,000 of population, but in New England the rate is considerably higher. In Connecticut it is 85.1; in Rhode Island, 93.3; in Massachusetts, 101.4; in New Hampshire, 104.4; in Maine, 107.5; and in Vermont, 111.7. Probably two factors are concerned in this phenomenon: first, the relatively high age distribution; second, the greater predominance of Yankee stock in the New England states. In Kentucky the rate is only 48 per 100,000.

THE BOARD OF HEALTH, NEWPORT, R. I., was organized on January 30, 1914, with Dr. Rufus E. Darrah president and Dr. George D. Ramsay secretary. During the year thirteen regular and eighteen special meetings have been held. The first annual report of the Board gives the following facts: The number of deaths from all causes was 333, which gives an annual death rate of 11.35. The cause of the greatest number of deaths was organic disease of the heart, with cerebral hemorrhage coming second. No deaths were reported from typhoid fever for the year. There occurred but seven cases, two of the patients being taken from vessels in the harbor. Four deaths occurred from whooping cough. One case of pellagra, resulting in death, the first ever known to occur in the city, was reported.

TYPHOID AT GRAFTON STATE HOSPITAL.—In the monthly bulletin of the Massachusetts State Department of Health for June, 1915, is published a report of a recent typhoid outbreak in the Grafton State Insane Hospital:—

"This institution consists of what was formerly called the Worcester Insane Hospital, Summer Street, Worcester, as well as four colonies situated in North Grafton.

"In Worcester at the time of the outbreak there were 638 patients and 169 employees, while at North Grafton there were 831 patients and 200 employees, making a total of 1838 for the entire institution.

"On May 8, 1 positive typhoid reaction was obtained from Worcester and 2 from Grafton, and 1 each from both places on May 15. The Worcester cases were from two different female wards, fed from a common kitchen, and no cases or suspicious cases were found in the male wards or among the employees.

"The 3 cases in North Grafton were from three different female wards, fed in three different dining rooms, served from a common kitchen. These three dining rooms and kitchen are in the Pine Service Building, where 330 patients and 40 nurses take their meals. Very little of the nurses' food is handled by the patients, as most of this is done by the cook and her assistant, while most of the patients' food is handled and served by the patients themselves. In all departments at North Grafton milk is freely served and used three times a day. No cases or suspicious cases were noted on the male ward or among the employees at North Grafton.

"No history of recent illness, malaise or indisposition of any kind was obtained from those handling the milk or other food.

"The milk supply of the institution was obtained from B. and from N. of North Grafton, as well as about 200 quarts daily produced on the two farms connected with the colony in North Grafton. All of the milk, however, was not mixed; none of N.'s milk went to North Grafton; none of the milk from Colony 1 went to Worcester; and none of B.'s milk was used in Grafton. The milk from the O. farm in North Grafton was the only portion of the supply used at both Grafton and Worcester. The milk was not bottled, but was delivered by B. in his own cans, which were handled, collected and washed by his men. The milk from N. is collected in cans furnished by the institution. These cans, as well as those used at the two farms in Grafton, are furnished by the institution and are washed with steam and warm water at Grafton, but not actually sterilized. Since the beginning of the outbreak, however, satisfactory additional precautions have been taken.

"There was no history of typhoid or any other suspicious indisposition on the B. and N. supplies.

"As soon as the first cases appeared, all suspected 'contacts' were vaccinated, and later, all employees; and when it was suggested that every one in the institution be vaccinated, arrangements were made forthwith to carry out this suggestion at the rate of about 100 cases a day. To date (June 14) all employees at Grafton and Worcester have received their third treatment, and all patients, with a very few exceptions, have received their second, so that inside of ten days every one in the entire institution will have been vaccinated."

Obituary.

CHARLES WILLIAM PRENTISS, Ph.D.

DR. CHARLES WILLIAM PRENTISS, who died of duodenal ulcer on June 12, 1915, at Chicago,

was born in Washington, D. C., on August 14, 1874. His youth was spent at Middlebury, Vt., and he graduated from Middlebury College in 1896. Later he studied in the department of zoölogy at Harvard University, from which he received the degree of Ph.D. in 1900. For a year he taught as assistant in anatomy at the Harvard Medical School and then devoted two years to travel and study in Europe, chiefly at Freiburg, Naples and Strassburg.

Returning to the United States in 1903, Dr. Prentiss held teaching appointments in the zoölogical departments of Western Reserve University and of the University of Washington at Seattle. In 1909 he was appointed assistant professor of anatomy at the Northwestern University Medical School, and in 1913 became professor of microscopic anatomy in that institution, a position which he held until the time of his death.

Dr. Prentiss was a member of the Association of Anatomists, the Society of Naturalists and the Society of Zoölogists. He was a prolific writer on topics in anatomy and zoölogy, and published many papers presenting the results of his own investigations in these fields of research. In January, 1915, was published his text-book of embryology, a work which summed up the experience of his professional and scientific career and which was reviewed in the issue of the JOURNAL for April 29, 1915 (Vol. clxxii, No. 17).

In an obituary notice of Dr. Prentiss by S. Walter Ransom in the issue of *Science* for Aug. 6, is the following estimate of his character and professional ability:—

"Professor Prentiss's scientific work was characterized by a scrupulous attention to detail and by the perfection of his technical methods. He handled with great success and on difficult material the most delicate of neurological methods—the methylene blue stain. His dexterity was shown again in remarkable dissections of embryos, drawings from which appear in his book. He brought to all his work an unusually clear mind and a keen insight into fundamental problems.

"Reticent, almost shy, by nature, and prevented by the condition of his health from often joining his colleagues at the regular Christmas meetings, Dr. Prentiss was intimately known to only a chosen few. To them he was endeared by reason of his unflinching good humor, generous motives and loyalty to high ideals and to his friends. Admired and respected by all conscientious students and loved by those who came into close contact with him, he helped greatly toward the establishment of high standards of scholarship and manhood in the student body."

Miscellany.

A GRAECO-EGYPTIAN OBSTETRIC INSCRIPTION.

In a recent bulletin of the Archeological Society of Alexandria, Professor G. Arvanitakis publishes the text of a Greek inscription lately discovered in Egypt, relating to a patient, Herois, who died in childbed, and the obstetric circumstances associated with her death. The *Lancet* presents the following translation of the inscription and comment upon it:—

"Who is the dead one? Herois. How and where? Having a tumor (όγκος) in the stomach. And, notwithstanding that we placed a weight (in the form) of Isis; the mother was lost very quickly, and then the child also. What was her age? Eighteen. So Herois was in the flower of her age. Oh, the unfortunate one. May Osiris render her ashes light and grant her sweet water.' The story told in this record is one which, it is to be feared, was of frequent occurrence about the commencement of our era. Herois's first accouchement had arrived, and the doctor, or midwife, acting as attendant, finding the delivery delayed, proceeded by mechanical means to accelerate matters. He took a weight made in the form of a figure of Isis, a presiding deity on such occasions, and either placed it upon the mother's abdomen as, as is more probable, attached it by a cord to the already projecting part of the infant. In this case the mother would have been placed in a sitting posture, resting upon two stools, or standing erect. The erroneous practice in the case referred to produced the delivery of the child, doubtless injured, for it died shortly after the mother. The word translated tumor is όγκος, which Galen uses solely with that meaning."

ANCIENT REMEDIES FOR HICCOUGH.

A RECENT article by Dr. John A. Wyeth of New York on hiccough and on the various remedies therefor led Mr. Philip Hale to extract from classic and medieval literature a number of such remedies whose efficacy was considered certain. He writes in part as follows upon this interesting subject:—

"The remedies are countless. The ancients, apparently ignored by Dr. Wyeth, recommended many. They knew that if you took the medicine composed of the three kinds of pepper and drank wine immediately afterwards, you would have the hiccup. When emptiness of the stomach is a cause, sneezing will not put an end to the spasms. Paulus Aegineta advises in this instance use with wine, or nitre in honeyed water, or hartwort, carrot, cumin, ginger, calamint, or

Celtic nard. In severe cases, try the vinegar of squilla. Holding the breath is of use. Aetius gave emetics, then narcotics, and finally applied a cupping instrument with great heat to the breast, belly and back. Alexander began with bleeding when the hiccup was connected with inflammation of the stomach or liver. The author of the 'Euporista' put the patient's feet in hot water, gave him tepid drinks, and applied hot fomentations to the belly. We now quote from Pliny the elder, translated by Philemon Holland: 'But, against the Hocquet or Yex there is a notable medicine made with it (colewort), together with coriander, dill, honey, pepper and vinegar. If the pitch of the stomach be anointed therewith the patient shall evidently perceive that it will dissolve the wind and puffing ventosities therein.'

"Pliny gives 15 or 16 remedies. Garden mint, with the juice of a pomegranate, is one of them. And note this use of mint: 'The juice of mint is excellent for to scour the pipes and clear the voice, being drunk a little before that a man is to strain himself either in the choir, or upon the stage, or at the bar.' This shows why consumers of mint juleps are talkative.

"And now consult Mr. Topsell's 'History of Four-Footed Beasts': 'If that any man do get and put up the shoe of a horse being struck from his hoof as he travelleth in his pace (which doth many times happen) it will be an excellent remedy for him against the sobbing in the stomach called the hicket.'

"Turning to that invaluable book of medicine, 'A Thousand Notable Things of Sundrie Sortes,' by Thomas Lupton (London, 1627), we find (Book IV, 82): 'Stop both your ears with your fingers and the hiccup will go away within a while after. Proved.' Here is a quicker cure (Book VI, 4): 'It is proved, and a secret: that if you give to them that have the hiccup every morning three hours before meate one roote of greene Ginger, and immediately after drinking two draughts of Malmesey, you shall see that he will become cured. Emperici benedicti victorii.'"

BRITISH SURGEONS IN INDIA.

In the issue of the *British Medical Journal* for May 25, 1907, appeared an article entitled "British Medicine in India," in which was given an account of some of the physicians who played an important part in the establishment of the British Empire in India. Among these was Dr. Gabriel Boughton who, in 1645, obtained for the East India Company the concession which first gave it a secure footing in India. Another was Dr. William Hamilton, who in 1715 cured the Indian Emperor at Delhi of a malignant distemper, in gratitude for which the Great Mogul received favorably the British Embassy, of which Hamilton was a member.

Dr. John Zepheniah Holwell in the 18th century was chief surgeon of the Bengal presidency and afterwards was mayor of Calcutta. When the city was sacked in 1756 the governor fled and Dr. Holwell took command of the garrison and was one of the prisoners who survived the Black Hole. In 1760 Holwell succeeded Lord Clive as governor of Bengal.

Another memorable practitioner of Calcutta was Dr. Richard Cheese, who is commemorated by a monument in that city. In the issue of the *British Medical Journal* for June 12, 1915, is quoted the following epitaph from his tombstone. Dr. Cheese went to India in 1792 and died there in 1816.

Sacred to the Memory of the late
RICHARD CHEESE, Esq^r,
Surgeon to the Hon^{ble} Bengal Company's
Establishment and Garrison Surgeon of
Fort William
Dedicated by Public Contribution
In token of the high and well merited Esteem of
the Community
For the Enlarged and Practical Philanthropy of
that Gentleman's character.
Perhaps never had the remains of a Christian in
India been followed to their tomb
With more heartfelt and Expressed Regret
Than were manifested by the Numerous Assem-
blage
Of all classes of the Society of the Place
Who attended the Funeral on the 15th Jan.,
1816.
He had long exercised his Professional Talent
With an Ability which did Honour to Him as a
Practitioner of Medicine,
And with a Munificence Worthy of the Religion
he professed.
If a change of Air, or Expensive Nutriment
were desirable
But could not be afforded from the Resources of
the Patient—
Mr. Cheese supplied the Means.
And when all Human Endeavours proved
Unavailing
His Purse was ever open to clothe and support
the destitute Mourners.
In the Society of His Equals
Such was also the cheerful benignity of his
Manners
That he was ever a Welcome Guest
Alike to the children and to the Heads of the
Family.

BELGIAN PHYSICIANS' RELIEF FUND.

REPORT OF THE TREASURER OF THE COMMITTEE OF
AMERICAN PHYSICIANS FOR THE AID OF THE BELGIAN
PROFESSION FOR THE WEEK ENDING AUGUST 14, 1915.

CONTRIBUTIONS.

Dr. W. L. Keller, Hot Springs, Ark. \$ 5.00
Dr. E. C. Ellett, Memphis, Tenn. 10.00

Dr. David W. Cheever, Boston, Mass. 20.00

Receipts for the week ending August 14. \$ 35.00
Previously reported receipts. 1779.94

Total receipts. \$7814.84

Previously reported disbursements;
1625 standard boxes of food @ \$2.20. \$3575.00
1274 standard boxes of food @ \$2.30. 2930.20
353 standard boxes of food @ \$2.25. 804.84

Total disbursements. \$7310.04

Balance \$504.80

F. F. SIMPSON, M.D., Treasurer,
7048 Jenkins Arcade Bldg.,
Pittsburg, Pa.

UNITED STATES NAVY MEDICAL CORPS.

At the preliminary examination beginning July 4, 1915, held in various cities of the United States, for examination of candidates for appointment as assistant surgeons in the Medical Reserve Corps of the Navy with a view to subsequent examination and appointment in the Medical Corps of the Navy after a course at the Naval Medical School, the following candidates were found physically and professionally qualified:

1. Virgil Hope Carson, M.D. (Medical College of Virginia); Interne, New York City Hospital.
2. Elphege Alfred Gendreau, M.D. (Georgetown University Medical School); Interne, Providence Hospital, Washington, D. C.
3. Francis DeArmond Gibbs, M.D. (Georgetown University Medical School); Interne, Georgetown University Hospital and Children's Hospital, Washington, D. C.
4. John Harper, M.D. (Medico-Chirurgical College of Philadelphia, Pa.); Interne, Medico-Chirurgical College of Philadelphia.
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